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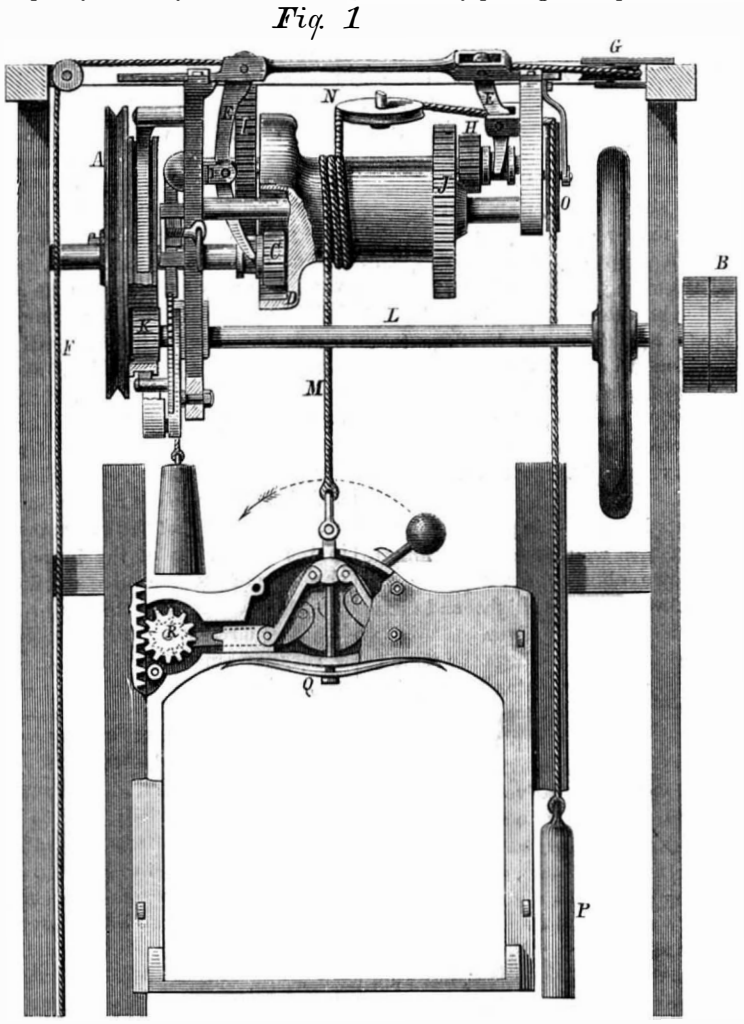
Timpe's Improved Elevators.

The accompanying engravings illustrate improvements in elevators, for which three patents, one bearing date Nov. 15, 1870, and two, August 22, 1871, have been obtained by Gustavus C. Timpe, of New Orleans, La., through the Scientific American Patent Agency.

There are several important and valuable features in these improvements, which relate particularly to elevators designed for use in stores and warehouses.

Fig. 1 represents an elevator called the "Differential Gear Elevator," which appellation indicates an important feature of its construction. The power is applied to it either by a rope passing over a grooved pulley, A, or by means of a belt running upon a suitable pulley, B, with a loose pulley and shifting gear. Upon the inner end of the shaft of the hoisting pulley, A, is a pinion, C, meshing into an internally toothed gear, D, which gear is cast with and forms part of the hoisting drum.

Fig. 1



In the position shown, the power is transmitted to the drum, through A, C, and D, but the pinion, C, is feathered upon its shaft, and may be shifted by the shifting apparatus, E E, this apparatus being operated from below by the rope, F, which passes around the pulley, G, and down over a pulley, not shown, for reversing the motion of the shifting apparatus, E. In throwing the pinion, C, out of gear with D, it is thrown into gear with the gear, I, and the pinion, H, is also thrown into gear with the gear, J. The power would then be transmitted through A, C, I, H, and J, to the hoisting drum, greatly increasing the purchase. An internal gear on the brake wheel of the hoisting pulley, A, meshes into the pinion, K, on the fly wheel shaft, L. The use of this fly wheel is, that when the hoisting pulley is employed, the power is applied while the hand is shifting its position on the rope, so that weights may be elevated conveniently by the use of one hand. if desired.

When the power is applied by belt to the pulley, B, it is transmitted to the hoisting drum either through K, C, and D, or by the routes indicated by the letters K, C, I, H, J, the latter combination being exceedingly powerful.

The hoisting rope, M, is not directly attached to the drum, but makes three turns about the latter, passing thence to and around an idler, N, and thence to a grooved pulley, O, thence down a well or channel in the frame work, being drawn down by a weight, P.

This weight is made enough heavier than the platform and its attachments to counterbalance their weight and run them up without the application of any other power, but still light enough that the weight of a man or parcel on the platform will cause it to descend.

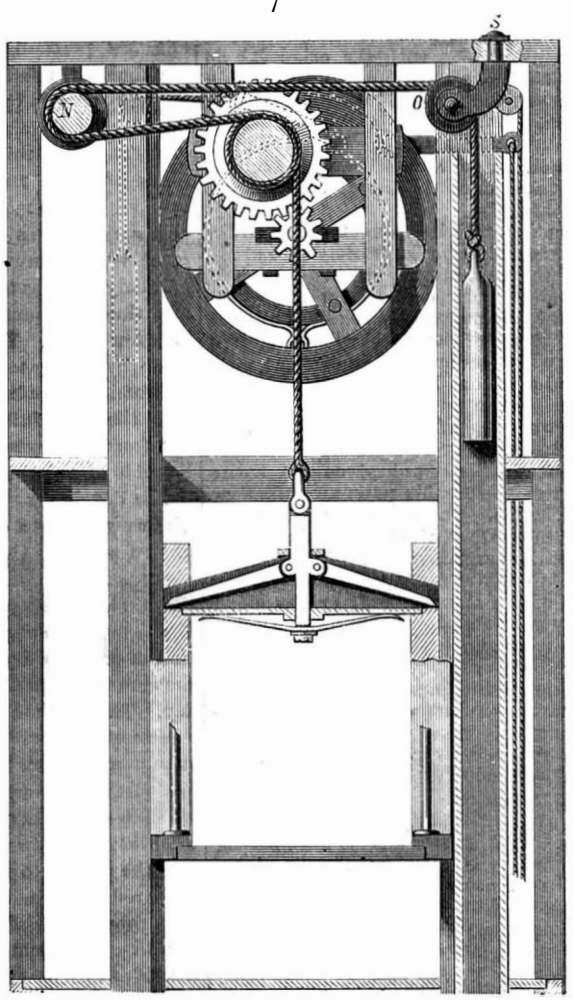
The friction of the rope upon the drum is ample to raise any weight the strength of the rope will sustain.

A safety apparatus is used to avoid accidents in case of breakage. When from any cause the connection of the rope with the platform should be broken, the spring, Q, will act upon a series of knee jointed levers, causing pawls to engage with ratchet teeth—shown in dotted outline—on spur wheels, R. Ordinarily these wheels play loosely on their pivots, but when held by the pawls, so that they cannot turn, they hold fast to the racks, and so prevent the fall of the platform. When racks are not used, the apparatus is modified so that the pawls engage directly with the wooden slide ways, being made chisel-pointed for that purpose, as shown in Fig. 2.

Fig. 2 shows a simpler form involving the same general principles, but without gear for increasing the purchase. To avoid too great angles and to keep the rope in the center of the drum when manilla rope is used, the idler, N, is placed at considerable distance from the drum, and the sheave, I, is made to turn on a pivot, S.

Fig. 3 shows an improved strap brake, used to check the downward movement of the platform. It consists of a metallic band or strap, T, a toothed sector, U, a weighted pawl, V, a lever, W, and ropes, X and Y. The strap, T, is pivoted to the toothed sector at Z. When the rope, Y, is pulled, the strap is drawn taut upon the perimeter of the brake wheel attached to the inner side of the hoisting wheel, A, Fig. 1. The weighted pawl then holds the segment in the same position, and keeps the strap uniformly tightened until the pawl is raised by pulling the rope, X.

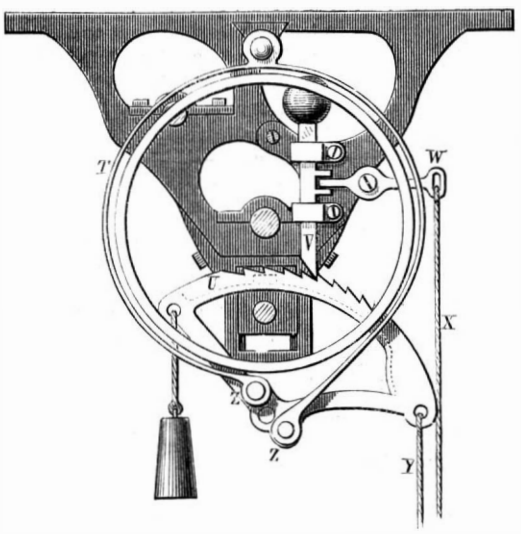
Fig. 2



TIMPE'S IMPROVED ELEVATORS.

We are informed that these elevators meet with much favor where they have been recently introduced, combining, as they do, many advantages with cheapness of construction. The smaller one, shown in Fig. 2, will meet the wants of small establishments, it is thought, much more completely than is the case with other elevators of equal cost hitherto placed on the market. Address, for further information, G. C. Timpe, 300 Camp street, New Orleans, La.

Fig. 3



SASSAFRAS OIL.—This oil, used for flavoring tobacco, confectionery, and in perfumery, has been, for the last two years made at Richmond, Va., and elsewhere in the same State. The herb only yields two per cent of its weight as oil, and this small quantity is reduced by the process of purification.

Mechanism for Adjusting the Rollers of Carding Machines.

This invention pertains to an improved construction and arrangement of parts, whereby the position of the bearings of rollers working in combination with the main cylinder of a carding engine or of other rollers, may be adjusted or regulated with facility and accuracy.

In applying the invention to the working and clearing rollers of carding engines, the roller bearing fits between ribs cast on the outer side of a plate, the inner part of which fits between ribs cast on the bend of the carding engine, the bearing, the plate, and the bend being secured together by a bolt and nut. The roller is adjusted by a right and left handed regulating screw, one part of which is screwed into a projection from the bearing, and the other part is screwed into the plate; consequently, when the regulating screw is turned partly around, the bearing is moved to and fro in the plate. The bearing of the working roller is regulated laterally, in addition to its motion to and from the center of the main cylinder, by nuts on a segmental screw, one end of which is screwed into the plate of the bearing of the roller, the other end passing through a recess in the corresponding plate of the bearing of the roller.

The regulating screw for the bearing of the working roller is made partly with a coarse thread and partly with a fine thread. When this regulating screw is turned partly around, the motion to or from the center of the main cylinder, imparted to the bearing, is equal to the difference between the two pitches of the threads. By this arrangement, the utmost delicacy of adjustment is secured. Mr. Edward Lord, of Todmorden, England, has recently patented this improvement in the United States.

The East River Bridge, New York.

The caisson for the Western or New York end of this colossal undertaking was launched four months since, and was towed to the foot of Roosevelt street, on Tuesday, September 12, and the sinking of it will be proceeded with immediately. The dimensions of this formidable construction are: Length, 172 feet, width, 102 feet, and hight, 21½ feet, and it draws 12 feet of water. Its total weight is estimated at 6,200 tuns; and timber (yellow pine) is chiefly used in its construction, lined with iron plate. Captain Murphy, New York pilot, had the task of towing the caisson from the Atlantic basin, which was successfully accomplished, by the use of six tug boats, in the short space of four hours.

Two shafts for the passage of workmen to and from the interior are provided, and two each for water and air. The water shafts are for the lifting of all the dug out soil from the bottom of the caisson. Four air compressors, each of twenty five horse power, are already at work, as the slipping of some planks in the temporary bottom has occasioned a leak. Twelve of such compressors will be employed at once. Colonel Roebling, the engineer entrusted with the entire work, expects that the foundations of the New York tower will be completed by December 1st.; and if it can be done, Colonel Roebling will see that it is.

The completion of the various railroads in Maine is adding rapidly to the value of the enormous lumber tracts in that State. Logs are now cut 250 miles from any water communication. The spruce timber of Maine is equal to any that is exported from Christiania, Riga, Revel, or any other port in Europe; and its consumption is worldwide, and the demand for it constantly increasing.

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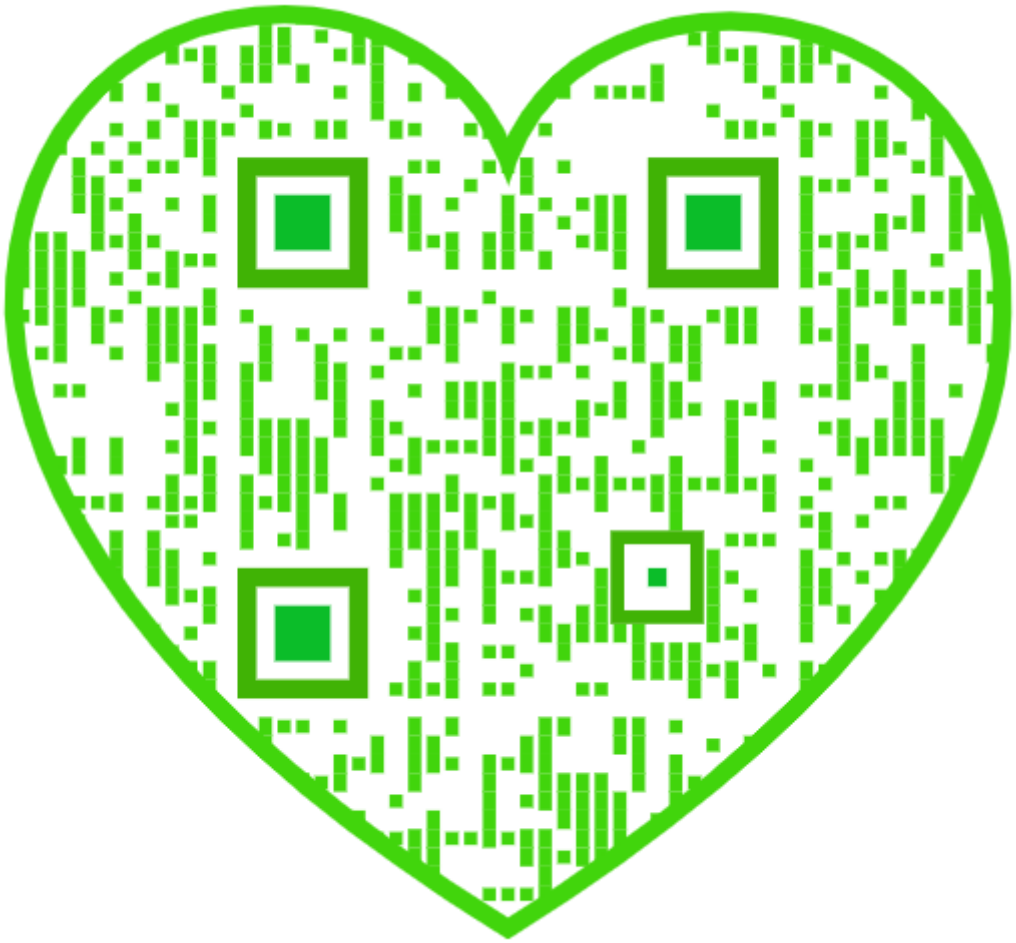

EXTENSION OF SARVIN'S CARRIAGE WHEEL PATENT.

In the matter of the application of James D. Sarvin for an extension of letters patent for improvement in carriage wheels, granted June 9, 1853, reissued August 11, 1868, and again reissued September 6, 1870.

LEGGETT, Commissioner:

The invention embraced in this patent consists of an improvement in wheels for vehicles, and it relates to the peculiar construction of a wooden hub, of the hub end of the spokes, of metallic flanges fitted to the hub and against the spokes, and especially to a combination of two or more of these parts.

The real gist of the invention consists in such construction and formation of the hub end of the spokes to form a solid belt entirely around the hub, to be reënforced by the strength of all the others in resisting direct strains, and in such an arrangement of metallic flanges as to unite the strength of all the spokes against strain in a lateral direction. The extension is stubbornly opposed on the grounds, first, that the device was not novel when originally patented. Second, that the reissued patents embraced new matter, enlarging the scope of the patent, and are therefore void. Third, that the patentee has been fully remunerated for all time, ingenuity, and expense bestowed upon it.

The remonstrants have made reference to some nine or ten patents issued at an earlier date in the United States, England, and France; but, upon careful examination, I am satisfied that no one of these, nor all of them together, constitute sufficient reference upon which to reject this application. One of them presents a wheel having many points of resemblance to the Sarvin wheel, but the hub is of iron, and consequently does not furnish a sufficient reference for a claim, the very object of which is to get rid of the rigidity of iron, yet retain symmetrical form and lightness, with great strength and durability.

Whether justly or unjustly, much prejudice has existed against iron hubs, and to secure a wheel of proper strength, with wooden hub, small, symmetrical, and light, has been the study of many in this branch of manufacturing.

In comparing the reissued patent with the orignal, I do not find such changes or additions as would warrant me in declaring the reissued patent void. I have doubts as to the second clause in the claim, but the doubts are not of such a character as to induce unfavorable action, especially in view of the fact that the reissued patent is now before the courts, and I prefer leaving the question of validity of this claim to that jurisdiction.

The utility of this invention. and its value to the public, are not only thoroughly established by the testimony of applicant, but also by that of the contestants. Its usefulness is attested by the great and growing demand for the wheel embodying it, and its value and importance to the public are evinced by the great superiority of the wheel when subjected to rough usage. Several witnesses engaged in carriage making testify to the great value of the improvement by swearing that carriages embracing the Sarvin improvement will sell in the market from twenty to fifty dollars higher than carriages having other wheels.

The applicant's statement of account gives the entire amount of remuneration received for his patent, at the time of his application, as $61,534 55. The testimony shows that during the first eight or ten years of the life of this patent, he spent almost his entire time and devoted all his energies in almost a fruitless effort to induce carriage makers to adopt his invention. It is only within the last four or five years that he has received any substantial income from it. His efforts at introducing it were persistent, and his diligence remarkable. The case affords an admirable illustration of the difficulty which inventors sometimes experience in introducing the most useful inventions, or in overcoming prejudices against their introduction. The law provides that in case the Commissioner is satisfied, by proper evidence, that the patentee has not received from the use and sale of his invention or discovery a reasonable remuneration for the time, ingenuity, and expense bestowed upon it, and the introduction of it into use, and that it is just and proper, having due regard for public interest, it is his duty to extend the patent. Under the head of reasonable compensation, it is just and proper that the Commissioner should take into consideration what the patentee has done for the public, not only in producing the invention, but in inducing the public to appreciate and accept it.

It is a fact in the history of almost every valuable invention that has been given to the world, that moneyed monopolies, and interested persons whose capital is invested in the manufacture of articles that will be rendered less valuable by the introduction of an improved article of the same class, have always conjoined their efforts to prevent the introduction of such improvements; and such will always be the case: consequently, it frequently happens that a large proportion of the life of valuable patents must be wasted in so bringing their merits before the public as to create a demand for them, despite the opposition of parties adversely interested. There is but little doubt that the improvement covered by applicant's patent is one of the most valuable ever introduced into road carriages. It not only gives more strength and durability to the wheels, but secures greater safety to life and limb.

The actual value of a patent in dollars and cents is very difficult to estimate, and I have but little confidence in the usual mode of ascertaining such values for Office use in extension cases; but I am satisfied that the value of Sarvin's invention is far beyond all he has received for it. Whether his invention is fully secured to him by his patent, I leave for the courts to determine. The extension is granted.

Steel Rails.

On the London and Northwestern, the largest and most important railway corporation in England, there is, near London, a narrow throat in the line, from which converges the whole system of rails employed in the London termini of this great railway. Here all passenger, goods and coal traffic has to pass; here, too, the making up of trains and shifting of carriages is continually going on. Mr. Henry Bessemer says: At this particular spot two steel rails were fixed on May 2d, 1862, on one side of this line, and two new iron rails were on the same day placed precisely opposite to them, so that no engine or carriage could pass over the iron rails without passing over the steel ones also. When the iron rails became too much worn to be any longer safe for the passage of trains they were turned the other way upwards, and when the second side of the iron rails was worn as far as the safety of the traffic would allow, the worn out rail was replaced by a new iron one—the same process being repeated as often as was found necessary. Thus we find, at the date of the last report March 1, 1865, that seven rails had been entirely worn out on both faces. Since then another rail has been worn out up to July. The endurance, under this severe test, of steel rails, over iron was as one to sixteen. The testimony is conclusive and irrefutable. This crucial experiment is cited by various writers, and is well known. When finally the steel rails were removed, they were found to be worn down to a thin blade, but preserved their form and tenacity uncrushed to the last!

An Account of a New Photographic Dry Process.

[Paper read by Thomas Sutton, B.A. before the British Association.]

The process which I am about briefly to describe, under the title of the "Driest of Dry Processes, appears to be the simplest and most satisfactory solution of a problem which for twenty years has occupied the attention of many leading photographers, namely, that of the preparation of dry plates.

Hitherto the invariable custom has been to prepare dry plates at home ready for use on a tour, to pack them very carefully, so as to exclude the access of air and moisture, and to trust to their good keeping qualities. By the method about to be described this trouble and risk are avoided, and the tourist can prepare his plates *en route*, on the morning of the day on which they are to be exposed, by simply pouring upon them a sensitive collodion emulsion, an operation which might be conducted at the rate of one plate prepared per minute, after which they can be put at once into the dark slides, ready for exposure, without being washed or any preservative applied to them.

This emulsion will keep for many weeks, and perhaps months, without losing its good qualities, or varying in the slightest perceptible degree. The development of the exposed plate is effected on the same day as the exposure, and is a very cleanly operation, requiring no nitrate of silver, and producing no stains upon the fingers, articles of furniture, etc. Thus, by this new process the practice of landscape photography is rendered so simple and certain that any intelligent person may quickly master it, and realize much success without the amount of fag, expense, dirt, and disappointment, which more or less accompany other methods.

It only remains to describe how the emulsion is made, and how the development is effected. This can be done in a very few words. The emulsion is a collodio-bromide of silver made by adding to an ounce of plain collodion, eight grains of bromide of cadmium and ten grains of nitrate of silver. It is then carefully "corrected," by which is meant tested, and treated so as to contain a very slight trace of unconverted bromide of cadmium.

The developement is effected thus:—The plate is placed, film upwards, in a dish of common well water for a minute or two, and then the well known alkaline developer is employed. This produces in a few minutes a bright and dense negative, requiring no intensification with silver.

The sensitive of plates thus prepared is about the same as that of ordinary dry plates. If rapid dry plates are required they must be specially prepared overnight for use the next day. The method consists in placing the plate in water, after coating it with the emulsion, for at least five minutes; then pouring over it an alkaline preservative composed of one part of albumen to four parts of water, to every ounce of which ten minims of ammonia are added, washing this off after it has remained a minute upon the plate, and then putting the plate into a box to dry during the night. Plates thus prepared are quite as sensitive as wet collodion ones. It has been proved possible to make an emulsion which shall, without this treatment, yield equally sensitive plates, but I am not able at present to give an exact formula for it.

Plates washed and treated as above described with an alkaline preservative may be used wet, and are equally sensitive. Thus a new wet collodion process is originated, without a nitrate bath, a bath of water being substituted for one of silver. The many advantages of such a process will be obvious to intelligent photographers, the principle one being that there is no free nitrate upon the film to attack the alkaloid salt of silver, or crystallize on drying. A wet film, prepared as described, might be exposed under water, or in a camera filled with water, a suitable lens, of course, being employed.

The key to success in the process described will consist in there not being any trace of nitrate of silver left in the emulsion, nor too large a trace of unconverted bromide of cadmium. In the former case fog, in the latter case insensitiveness, would result.

Interesting Electrical Experiment.

Astonishing as is the fact of the concentration of the power of a lightning-flash into a minute interval, yet as wonderful is the extent of the earth's surface affected by it, as will be seen from the following experiments of the writer, never before published: A galvanometer consists of a delicately suspended magnetic needle surrounded by a coil of copper wire, through which a current of electricity can pass; whenever this passage takes place the needle rapidly turns around its point of suspension. This being understood, I connected the wire of a galvanometer with the water pipes of Baltimore, and the other end of the coil was joined to a gas pipe of a house in the southwest part of the city. Thus a vast metallic system of electric nerves stretched away three miles to the northwest, to the reservoir, and about as many to the east and southeast over the city. A thunder storm was raging at the time, at so great a distance in the north that only the illumination of the clouds told when a flash occurred. Yet, whenever that flash took place, the needle was instantly deflected through ten or twenty degrees. The two occurrences were simultaneous, apparently, for I could detect no difference in the instant of their manifestation. Indeed, so sure an indicator of the flash was the galvanometer, that when I shut myself up in a dark room, signalling to an observer of the storm whenever the needle moved, and receiving a signal from him when a flash occurred, our signals were always simultaneous. The next day it was ascertained that the storm was over twelve miles distant; therefore, at least five hundred square miles of the earth's surface were affected (inductively) at each flash of the lightning.—A. M. M., in the *Evening Post*.

Wooden Nails.

In these days of millions of iron, copper, and zinc nails, tacks, and brads, of lightning, self feeding, and almost automatic nail machines, it is wonderful to find wooden nails coming into use. Wooden pegs made by the same machines as shoe pegs, are now largely used for fastening boxes, and manufacturers receive large orders from the West, for inch pegs for this purpose. In China, Japan, and Hindostan, pegs of bamboo have been always used in fastening tea chests and wooden packages. In this age, however, it looks like retrogression to use wood for purposes for which iron seems so much better adapted. As one of the curious freaks of the habit, so inherent in human nature, to return to former customs under the impression that they are novelties, the above is noteworthy; but we do not anticipate a fall in cut nails from this cause. The idea of using wooden nails seems to us a good one. The treenails used in ship building are an example of the value of such wooden nails. The rusting of nails exerts a very destructive action on timber, and this will be avoided by the use of wooden pins. Moreover, it is almost certain that before many years pass away, wood will become so valuable that it will not pay to use the material of packing boxes for firewood, as is at present done. Now, so long as iron nails are used, it becomes a difficult matter, and one involving the rapid destruction of tools, to use old lumber. The use of wooden nails will obviate this difficulty.

Green Varnish.

There is, says the *Cabinet Maker*, a most beautiful transparent green varnish employed to give a fine glittering color to gilt or other decorated works. As the preparation of this varnish is very little known, an account of it may in all probability prove of interest to many of our readers. The process is as follows: Grind a small quantity of a peculiar pigment, called "Chinese blue," along with about double the quantity of finely powdered chromate of potash, and a sufficient quantity of copal varnish thinned with turpentine. The mixture requires the most elaborate grinding or incorporating of its ingredients, otherwise it will not be transparent, and therefore useless for the purpose for which it is intended. The "tone" of the color may be varied by an alteration in the proportion of the ingredients: a preponderance of chromate of potash causes a yellowish shade in the green, as might have been expected, and *vice versâ* with the blue under the same circumstances. This colored varnish will produce a very striking effect in japanned goods, paper hangings, etc., and can be made at a very cheap rate.

Roaring of Aurora Borealis.

M. Becquerel read, at one of the last meetings of the Academy of Sciences of Paris, a paper on the Celestial Origin of Atmospheric Electricity, and he concluded by stating that the auroras result from discharges of this electricity, and thus he explained the roaring, more or less loud, heard by the inhabitants of polar regions. The greatest part of scientific men deny the occurrence of these sounds, but M. Becquerel, in support of his opinion, quoted the observations of Paul Rollier, the aeronaut, who started from Paris in December last, and descended fourteen hours after in Norway, on Mount Ide, at an elevation of 4,000 feet: "I saw through a thinner fog the moving of the brilliant rays of an aurora borealis, spreading all over its strange light. Soon after an incomprehensible and loud roaring was heard, which, when it ceased completely, was followed by a strong smell of sulphur, almost suffocating.

The Mammoth Cave.

A research into the recesses of this remarkable formation has recently been made by a party of scientific gentlemen and ladies, who made an excursion from Indianapolis, after the recent meeting of the American Association for the Advancement of Science. The party numbered one hundred and ninety persons, and some additions, of a most interesting nature, were made to our knowledge of the wonderful cave.

Professor Cope collected fourteen specimens of various animals living in the cave—among others, fish, crickets, centipedes, crawfish, etc. There are, in the waters of the cave, both fish and crustacea without the power of sight. Having lost this sense by having no use for it, their sense of hearing has developed to an unusual quickness, and it is exceedingly difficult to catch them. The geological feature of the cave, as is well known, belong to the secondary formations; and the crystals of gypsum, stalagmites, stalactites, and saltpeter, are to be seen here in enormous abundance. We hope soon to receive a formal report of this visit to one of the greatest wonders of the American Continent.

The Fish Crow.

A species of fish crow (*Corvus caurinus*) is very abundant in Oregon and Washington territories, where it is troublesome to the Indians, stealing their dried fish and other provisions. It is never killed by them, from superstitious fee'ings, but is driven away by children set to watch for that purpose. It is cunning, but very tame and impudent, allowing a very near approach, and when closely pursued retiring but a short distance. Like some species of gull, this bird is in the habit of carrying clams high in the air and then dropping them, in order to break the shell.

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How Salt is Manufactured at Turk's Island.

From an article in the *Overland Monthly*, describing sights and scenes there, we cull the following description of salt making: The island bearing this familiar name has been conspicuous for its production of salt, of which millions of bushels find their way into the markets of the world, our own country receiving about half a million bushels annually. Salt is obtained from sea water, by either extreme cold or heat; here it is made by solar evaporation. Lying under the intense rays of a tropical sun, the sea soon gives up its water and leaves its salt behind; and were it not for the influx of the mighty rivers of the tropics, and the general system of currents and tides, the ocean lying near the equator would soon become one vast sea of salt. For centuries, advantage has been taken of this natural process, and in the dry seasons, over a thousand natives are at work, in the different stages of the preparation of salt for the market. The sea water is let into the basins, or "pans," by a canal, cut through the beach, which separates the sea from the interior lagoons and affords a good foundation for the town proper.

This beach is a few rods—perhaps ten or fifteen—in width and back of this, extending toward the bluffs about a quarter of a mile, was originally a marsh, which has been converted into salt tanks. These tanks are shallow, with a varying depth of from eight to eighteen inches, the bottom made of stiff marl or clay, and they cover several hundred acres of this evaporating ground, divided into a great many compartments, varying from a quarter of an acre to two or three acres in size. These are separated from each other by low stone walls, which serve also as walks. In the middle of these is an impervious clay, which prevents the passage of water from one tank to another, unless by the little gateways or sluices, through which the supply is regulated. The water in these is found in all stages of evaporation. In some, you see the clear limpid water of the ocean; in others it has a roiled appearance, and, when far advanced in the process, it assumes a beautiful pink color. The first pond allows the subsidence of mud and other physical impurities, and is, consequently, the deepest. As the fluid runs from tank to tank, it gradually becomes thicker, giving up its water and becoming more and more concentrated, until it reaches the last and shallowest pan, where crystals begin to appear on its surface. These first crystals are purest, and are raked off with an iron hoe. Exposed for a still longer time, more crystals form, but these mostly collect on the bottom and sides, and are scraped off when the "mother liquor" is drawn away. They are then hauled in carts to the beach, where piles, like great, white snow banks, may be seen from the ship's deck.

This salt is more or less impure—the chief impurity being chloride of magnesium—and, to get rid of this, the heaps are covered with straw and hay; the chloride of magnesium, being deliquescent, absorbs moisture from the atmosphere and drains off, leaving the pure chloride of sodium---common salt—behind. To produce the same result, sometimes slaked lime is placed in the last tanks. The making of salt by solar evaporation depends greatly upon the absence of rain; and Turk's Island has this advantage, as well as extreme heat in summer. In addition, the trade winds constantly agitate the surface of the ponds, and thus facilitate vaporization.

Ex-Commissioner Mason on Patent Laws.

The chairman of the recent meeting of London Patent Agents—Mr. George Haseltine, M.A.,—has received from the Hon. Charles Mason, Ex-Commissioner of the United States Patents, to whom were submitted the resolutions on "Patent Law Reform," reported by us last month, the following interesting letter. Judge Mason was a most able and popular Commissioner, and is a gentleman of the highest legal and social position.

"Your favor reached me at a distance of a thousand miles from the city of Washington. In reply, I have the honor to say that an experience of twenty years has enabled me to form opinions, in some degree satisfactory to myself, on most of the topics therein presented. These I will now briefly state.

"I have never had any serious doubt of the wisdom of a judicious system of patent laws. If they create a monopoly and thereby limit the rights of others, they do nothing more than is inseparable from the institution of property of any and every kind. The owner of a horse or of a tract of land enjoys the same monopoly as the patentee, except that it is perpetual. It is difficult to find a reason for the protection of property in the one case, which would not apply with equal force in the other. Who can more justly claim the exclusive use of anything whatever, than he who has brought it into being? And what reflecting mind can doubt that the public welfare will in the main be best promoted by inspiring individual effort in respect to invention, through the same motive of private advantage as that which can alone excite it to the needed intensity in all the other walks of human life? It is sometimes replied that an inventor is entitled to the machine which he has invented and constructed, and to nothing more. But this does not present the true analogy. The subject matter of an invention is not the material body, but the living spirit and principle which may animate an indefinite number of bodies of the same general character, though all varied in mere form or the materials of which they are composed. Mechanical labor and skill can produce the one, inventive genius can alone create the other. Each is equally entitled to the favor of a just Government.

"The system of examination which has been adopted here is manifestly productive of much advantage to the public, as to the meritorious class for whose benefit the law is more immediately intended. I have doubts, however, as to the wisdom of lodging in the Patent office a power of rejection as unlimited as that which it now exercises. If the action of the examiners were merely advisory and adjuvant, leaving to the applicant the ultimate right to take his patent at his own risk after an adverse report, some of the chief objections to our system would be removed. I am inclined to believe that some such modification would be an improvement.

"By all means the patent fees should be small—barely sufficient to defray the expenses of the office. No other class of men does so much to promote the welfare of mankind as does that of inventors, and there is none that on the average is so poorly compensated for what it has done. To require inventors to pay a tax for the general support of the Government, over and above that which is imposed upon any other class, is calculated to discourage their efforts, and to check the progress of civilization in this most important particular. This not seem sound policy.

"Our American experience leads me to the conclusion that fourteen years is too short a limit for the lifetime of a patent. In most cases of real merit the old fourteen year patents are extended by the Office to twenty-one years, and often by special acts of Congress to twenty-eight years. The new law fixes a seventeen year limit, and withholds from the Patent Office the power of extending the same. I have little doubt, however, that many of these seventeen year patents will hereafter be extended by Congressional action. I do not think that twenty-one years is too long a period for their general continuance.

"I like the British system better than ours in one particular. Your fees are paid in instalments, leaving the inventor the right to keep the patent alive or not, at his option. If that plan were in operation here, a considerable portion of our patents would terminate their existence shortly after their birth. This would remove out of their way many useless patents which now act the part of the dog in the manger, and will never be heard from during the whole seventeen years, unless some subsequent inventor shall make some improvement thereon, which will make useful what would otherwise be worthless. Nothing is more common in our experience than after some highly useful invention has gone into successful operation, to find some unexpired patent which is worthless in itself, all at once revived and amended through a re-issue in such a way as to render the really meritorious invention subordinate. The courts often hold such useless patents invalid, but this does not protect the subsequent patentee against being greatly harassed and annoyed. As far as practicable, it would be desirable to prevent difficulties of this nature from presenting themselves. The French plan of annual payments is carrying the matter rather too far. I like the British system in this respect better than either the French or the American, and believe that nothing is wanting therein but a diminished rate of fees.

"In relation to experts, they are often very useful, but those who are professional are looked upon with much suspicion, and their opinions have little weight with either court or jury. In this way what might otherwise be a great evil carries with itself, to a great extent, its own remedy. And as to jurors, their interposition is generally avoided by proceedingsin Chancery to obtain in junctionswhich are the most usual remedies for infringements with us."—*Engineering.*

Spiritualism.

Professor Allen Thomson, President of Section D, British Association, in his opening address, concluded as follows:

"I cannot conclude without adverting to one aspect in which it might be thought that the appreciation of biological science has taken a retrograded rather than an advanced position. In this, I do not mean to refer to the special cultivators of biology in its scientific acceptation, but to the fact that there appears to have taken place of late a considerable increase in the number of persons who believe, or who imagine that they believe, in the class of phenomena which are now called spiritual, but which have been known since the exhibitions of Mesmer, and, indeed, long before his time, under the most varied forms, as liable to occur in persons of an imaginative turn of mind and peculiar nervous susceptibility. It is still more to be regretted that many persons devote a large share of their time to the practice—for it does not deserve the name of study or investigation—of the alleged phenomena, and that a few men of acknowledged reputation in some departments of science have lent their names, and surrendered their judgment, to the countenance and attempted authentication of the foolish dreams of the practitioners of spiritualism, and similar chimerical hypotheses. The natural tendency to a belief in the marvelous is sufficient to explain the ready acceptance of such views by the ignorant; and it is not improbable that a higher species of similar credulity may frequently act with persons of greater cultivation, should their scientific information and training have been of a partial kind. It must be admitted, further, that extremely curious and rare, and to those who are not acquainted with nervous phenomena, apparently marvelous phenomena, present themselves in peculiar states of the nervous system—some of which states may be induced through the mind, and may be made more and more liable to recur, and are greatly exaggerated by frequent repetition. But making the fullest allowance for all these conditions, it is still surprising that persons, otherwise appearing to be within the bounds of sanity, should entertain a confirmed belief in the possibility of phenomena, which, while they are at variance with the best established physical laws, have never been brought under proof by the evidences of the senses, and are opposed to the dictates of sound judgment. It is so far satisfactory in the interests of true biological science that no man of note can be named from the long list of thoroughly well informed anatomists and physiologists, who has not treated the belief in the separate existence of powers of animal magnetism and spiritualism as wild speculations, devoid of all foundation in the carefully tested observation of facts. It has been the habit of the votaries of the systems to which I have referred to assert that scientific men have neglected or declined to investigate the phenomena with attention and candor; but nothing can be further from the truth than this statement. Not to mention the admirable reports of the early French academicians, giving the account of the negative result of an examination of the earlier mesmeric phenomena by men in every way qualified to pronounce judgment on their nature, I am aware that from time to time men of eminence, and fully competent, by their knowledge of biological phenomena, and their skill and accuracy in conducting scientific investigation, have made the most patient and careful examination of the evidence placed before them by the professional believers and practitioners of so-called magnetic, phrenomagnetic, electrobiological, and spiritualistic phenomena; and the result has been uniformly the same in all cases, when they were permitted to secure conditions by which the reality of the phenomena, or the justice of their interpretation, could be tested, namely, either that the experiments signally failed to educe the results professed, or that the experimenters were detected in the most shameless and determined impostures. I have myself been fully convinced of this by repeated examinations. But were any guarantee required for the care, soundness, and efficiency of the judgment of men of science on these phenomena and views, I have only to mention, in the first place, the revered name of Faraday, and in the next, that of my life-long friend, Dr. Sharpey, whose ability and candor none will dispute, and who, I am happy to think, is here among us, ready from his past experience of such exhibitions, to bear his testimony against all classes of *levitation*, or the like, which may be the last wonder of the day among the mesmeric or spiritual pseudo-physiologists. The phenomena to which I have at present referred are in great part dependent upon natural principles of the human mind, placed, as it would appear, in dangerous alliance with certain tendencies of the nervous system. They ought not to be worked upon without the greatest caution, and they can only be fully understood by the accomplished physiologist who is also conversant with healthy and morbid psychology. The experience of the last hundred years tends to show that while there are always to be found persons peculiarly liable to exhibit the phenomena in question, there will also exist a certain number of minds prone to adopt a belief in the marvelous and striking in preference to that which is easily understood and patent to the senses; but it may be confidently expected that the diffusion of a fuller and more accurate knowledge of vital phenomena among the non-scientific classes of the community may lead to a juster appreciation of the phenomena in question, and a reduction of the number among them who are believers in scientific impossibilities."

Marble Quarrying in Italy.

Nearly one third of the entire mining and quarrying production of Italy is derived from its renowned marble quarries, of which those at Carrara, Massa, and Seravezza are most celebrated. The two latter have only been worked since about thirty years, while Carrara furnished its snowy rocks to the Roman artists in the days of Cæsar and his successors. Of the six million francs now paid each year for Italian marble nearly one half is drawn from the United States. We have therefore an interest in the economical management of the quarries, and should see that our money does not go towards sustaining old fashioned indolence. Such is, however, the case. A cubic meter of ordinary Carrara marble, whose value at the quarry is about 100 lira (a lire nearly nineteen cents) costs more than double that sum when delivered on board ship—no more than a mile or two from where it was cut. The extra amount is absorbed by antediluvian tolls and means of transportation. A railroad is much desired, and would greatly reduce expenses, but there is too little native enterprise to warrant a speedy realization of this wish. Although 685 separate quarries have been established in Carrara alone, there does not appear to be any competition amongst their managers or proprietors. The *dolce far niente* system appears to suit them far better than the industry of enterprise. The consequence is that they have nearly lost the entire trade of Northern Europe, which has been gained by the active and energetic people of Belgium, whose marbles, though not as perfect, are only second to those of Italy, in Europe.

Oxy-Hydrogen Gas Lights.

The *Building News* says: A company is being formed for the purpose of lighting the cities and towns of the United Kingdom with the application of oxygen gas, as a considerable portion of New York has been for some time, and as Paris, Vienna, and Brussels are about to be. When common highly carbureted hydrogen is properly burnt with oxygen it gives a white light so pure that it may be seen for twenty or thirty miles; and by supplying this sustainer of combustion direct to the flame, the present vitiation of the air will be entirely done away with. The value and importance of oxygen is, indeed, generally known, but hitherto the cost has been prohibitory. The promoters of the company are in possession of a discovery by which oxygen can be obtained at one third the expense of ordinary coal gas, and a complete and very desirable revolut on is on the verge of being made in the illumination of our streets and houses. The parties connected with the movement are said to be substantial, and the capital to be subscribed one million. [We wish the *Building News* had pointed out the considerable (or any) portion" of New York lighted by oxy-hydrogen gas lights; it would have been interesting information to New Yorkers.—EDS. SCI. AM.]

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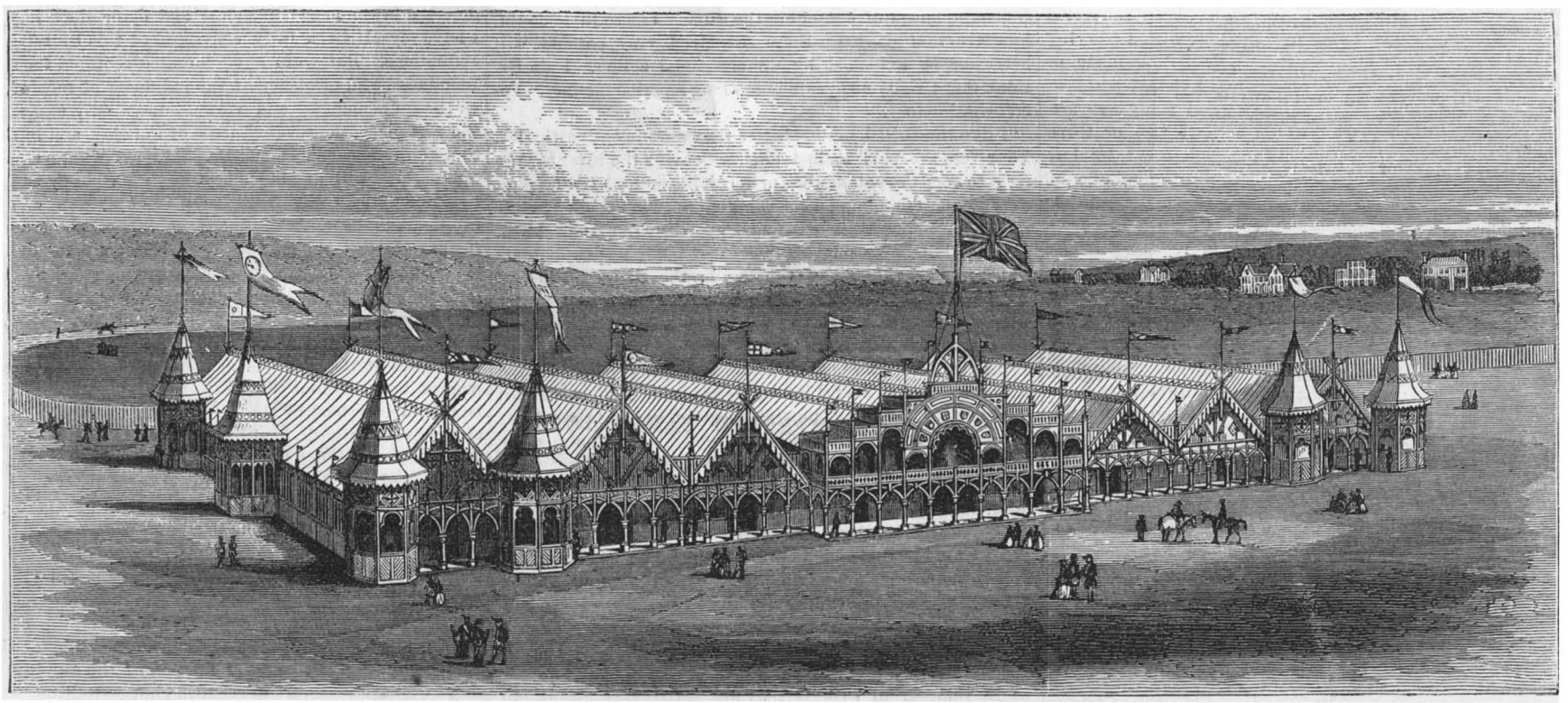
THE NEW RESTAURANT AT WIMBLEDON CAMP.

Wimbledon Common, in the suburbs of London, has been long a favorite resort for the volunteer rifle associations of England. Large numbers congregate there on various occasions to shoot for prizes, many of the latter being of a character and value which excites great competition. These Schuetzenfeste, as the Germans would call them, having necessitated the provision of more ample accommodations for the refection of the members of the associations and the large numbers of spectators that flock to the Common to see the shooting, the National Rifle Association has caused to be erected the new restaurant pavilion, of which the accompanying engraving is a representation, and which is now considered one of the most attractive features of the camp.

It covers an area of upwards of 40,000 superficial feet, and contains a bar 200 feet long by 40 feet wide, a second class dining room capable of dining 600 persons, a first class dining room for more than half that number, besides waiting and retiring rooms, bakehouse, kitchen, stores, etc. A canteen about 80 feet by 20 feet forms a separate pavilion; along the front runs a verandah about 200 feet long, constructed with semicircular interlacing ribs sprung from upright posts. As the buildings have to be taken down at the close of the camp meeting and be re-erected each succeeding year, the method of construction is adapted to facilitate this necessity. The walls are made in sections of a uniform size, and are put together with bolts, and the parts as a rule are interchangeable. Internally, all the work is stained and varnished but the outside is painted blue and white to harmonize with the entrance and offices.

Our readers will agree with us that this design combines great beauty with convenience, and it could easily be modified in its interior arrangements to adopt it to the wants of agricultural and mechanical associations, for holding the annual fairs which have now become so universal throughout the country.



THE NEW RESTAURANT AT WIMBLEDON CAMP, ON WIMBLEDON COMMON, LONDON.

Improvements in the Manufacture of Wire.

Messrs. Hill and Ward, Newport Wire Mills, Middlesborough, Eng., have recently patented, in conjunction with Mr. Claus, certain improvements in the manufacture of wire, which appear to be of a valuable character, judging from the samples which we have seen of wire made by this process. In the ordinary process of manufacturing wire, it is usual to heat the rod from which it is made, or the wire itself, to a bright red heat, and to allow it to cool down slowly, in order to reduce the metal to the necessary degree of softness or ductility which will allow it to be drawn to a less diameter. This operation is termed annealing, and is carried on in covered or closed cast iron tubes or pots or furnaces in which the rods or wire are or is placed, and to which heat is applied externally. Although covered or closed receptacles are employed for this purpose, access of air cannot be entirely prevented, and a consequence of this process of annealing is that the rod or wire becomes coated with a thin skin of scale or oxide which prevents the possibility of its being, in that condition, drawn out into finer wire. In order to obviate this difficulty, it is necessary to remove the scale or oxide, which is usually done by dissolving the same by means of a diluted acid, diluted sulphuric arid, or diluted hydrochloric acid being commonly employed for this purpose. It should be observed that the application of the acid at this stage has the effect of rendering the metal brittle or "rotten," which is especially the case with steel or iron wire. The rods or wire having been thus cleaned with diluted acid, and afterwards washed in water, steeped in lime water, and dried, are or is ready for being drawn to a finer diameter by the well known means adopted for that purpose. In practice, it is found that after having passed through two, or at most three holes, the metal of which the wire is made has, by the operation of drawing, become so hardened that it is impossible, without risk of breaking it, to draw it any further. The process of annealing or softening has then to be resorted to again, and a fresh coating of scale or oxide is formed, which has to be removed as before. The finer the wire is required to be, the oftener these operations have of course to be repeated, and the finer the wire becomes, the more detrimental is the action of the acid upon its quality.

The object of the said invention is to avoid some of these disadvantages, and particularly to prevent the access of air and consequent formation of scale or oxide during the annealing process, and to dispense with the necessity of cleansing the wire with acid, thereby avoiding the consequence of rendering brittle or rotten, and further to effect the annealing in very much less time than by the processes at present employed. These objects are accomplished by annealing or softening the wire or other metallic articles by immersing the same in a bath of flux heated to the temperature necessary for that purpose. In this bath, the wire or other articles are allowed to remain until they have acquired the temperature of the same, and until they have become annealed, when they are withdrawn in a red hot state. A portion of the flux will necessarily adhere to the wire, forming a coating which will continue to protect the metal from oxidation until it is cold. When cold, the coating of flux is removed from the annealed wire by means of hot or cold water. The flux or fluxes which are employed for this purpose may be composed of one or more substances or of mixtures of various substances, their other qualities and composition being immaterial, so long as they have, firstly, the property of being non-volatile or only slightly volatile; secondly, of having no destructive action upon the wire or other articles; thirdly, of fusing into a thin mass at a red heat; and fourthly, of being soluble in water after fusion. Of the substances which have these properties, it is preferred to use chloride of calcium, hydrate of soda, and silicate of soda, as being the cheapest and most suitable, but hydrate of potash, borate of soda, borate of potash, silicate of potash, carbonate of potash, carborate of soda, chloride of sodium, or other substances of similar properties, and fulfilling the above mentioned conditions, may also be used.—*The Engineer.*

The Cause of Typhoid Fever.

Dr. E. M. Snow, of Providence, R. I., in the *Medical and Surgical Reporter*, says: There are several diseases prevalent in New England, the causes of which are mysterious, and seem thus far to baffle all investigation. Among them are typhoid fever and diphtheria. It is very common, in the voluminous reports of some "Health Departments," to ascribe these diseases to foul air from sewers, and one eminent physician, well known throughout the land, in an elaborate essay, gives the use of ice as the chief cause of dipththeria.

A sufficient answer to these theorists is the fact that both typhoid fever and diphtheria prevail tenfold more in the most rural districts of New England, where sewers and the use of ice are almost unknown, than in cities. We have long been satisfied that the cause of typhoid fever is of vegetable origin, while the cause of typhus or ship fever is undoubtedly of animal origin.

A recent report of a local outbreak of typhoid fever, in Islington, England, which we find in the *British Medical Journal* of November 26, 1870, is extremely interesting and valuable in illustration of this subject.

It seems that in July and August, 1870, there was a severe outbreak of typhoid fever in the parish of Islington, which it was impossible to account for on any theory of local miasm, bad drainage, or poor water supply, as none of these causes existed there. Besides this most of the cases of fever were in the houses of the wealthy, which were free from the commonly reputed causes of this disease.

Within less than a semicircle of a quarter of a mile radius, 168 cases of typhoid fever occurred within ten weeks, and thirty persons died.

Many causes for the sickness were named, all of which were easily shown to be groundless, until, at last, some one suggested a connection between the disease and the distribution of milk from a particular dairy. As the investigation progressed, the evidence became entirely convincing that this was the true explanation of the disease. Out of 140 families supplied with milk from this dairy, 70 suffered from typhoid fever. The disease picked out the customers of this dairy in separate streets and squares, leaving other houses immediately adjoining. It attacked females and children, the largest consumers of the milk, out of all proportion to male adults, and in several instances the only persons who had the fever in several families were those who used this particular milk.

The fact seemed to be established that the milk from this dairy was the cause of the fever, and the next step was to ascertain how the milk became contaminated.

An investigation showed that the water supply at this dairy was from an old underground tank. This water tank was built of wood, and was much decayed, and in part had fallen away. The probability seemed to be that the mixture of water from this tank with the milk was the cause of the fever. The owner of the dairy suggested that as the milk cans were washed with this water, possibly enough might remain in them to poison the milk.

The case is quite interesting, as affording a possible clue to the discovery of the causes of this mysterious and fatal disease.

A few months since in this city, there were several cases of typhoid fever, the origin of which was mysterious, and the suggestion was made that it was connected with the supply of milk. In that case, the family from which the milk came had the fever, and some persons thought the spread of the disease was due to contagion. The case we have related from England may suggest a possible cause for the disease in this city without a resort to the doctrine of personal contagion, which the best authorities do not ascribe to typhoid fever.

Weights and Measures.

WEIGHTS.—One milligramme is equal to $\frac{1}{64}$ grain nearly; one centigramme is equal to $\frac{1}{6}$ grain nearly; one decigramme is equal to $1\frac{1}{2}$ grains nearly; one gramme is equal to $15\frac{1}{2}$ grains nearly; one decagramme is equal to 154 grains nearly; one hectogramme is equal to 1,543 grains nearly; one kilogramme is equal to 15,432 grains nearly.

MEASURES OF CAPACITY.—One millilitre is equal to $15\frac{1}{2}$ grain measures of water; one centilitre is equal to 154 grain measures, or 3 fluid drachms nearly; one decilitre is equal to 1,540 grain measures, or $3\frac{1}{2}$ fluid ounces nearly; one litre is equal to 15,406 grain measures, or $2\frac{1}{10}$ pints nearly; one cubic centimetre of water at its maximum density weighs $15\frac{1}{2}$ grains nearly, and is $\frac{2}{7}$ths of a fluid dram nearly.

MEASURES OF LENGTH.—One millimetre is equal to $\frac{1}{25}$th inch nearly; one centimeter is equal to $\frac{2}{5}$ths inch nearly; one decimetre is equal to $3\frac{9}{10}$ths inches nearly; one metre is equal to $39\frac{1}{3}$ inches nearly; $\frac{9}{100}$ths metre is equal to 36 inches or one yard, nearly.—*Photographic News.*

IMMENSE quantities of cast iron nails are manufactured in Staffordshire, England. Over a thousand tuns of iron are annually consumed for this particular industry. The appliances for casting are so well perfected that one hand can produce 750,000 nails of the smallest size in a day, while 52,000 of the larger size can be made in the same period. The molds contain large numbers of connected forms for the nails, and the latter hang together when removed therefrom, and are broken apart. They are subsequently tempered in oxide of iron and made malleable.

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Improved Model for Canal Boats.

Among the many devices invented and suggested to avoid side swells in navigating canal boats, the one of which the accompanying engraving is an illustration claims attention.

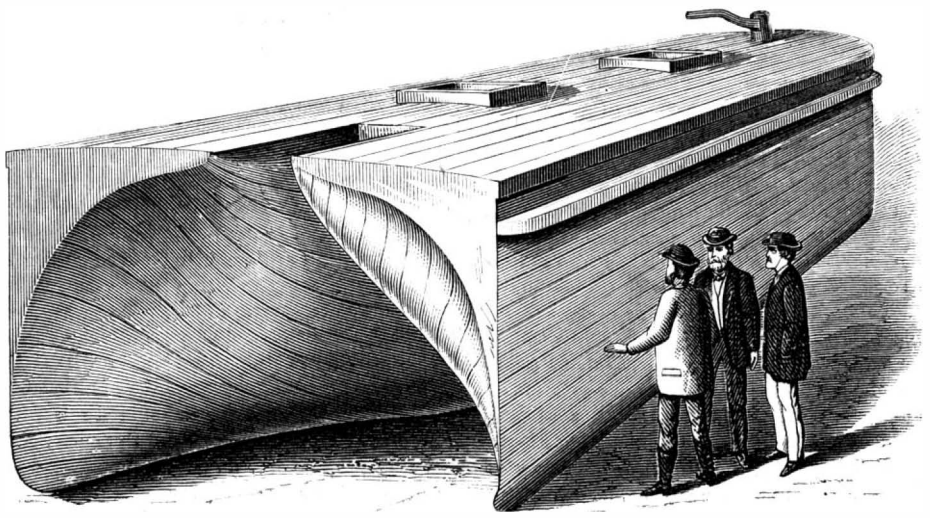
It has long been held by many conversant with the subject of canal navigation, that scarcely any advance in the speed of canal boats, as at present constructed, is possible, unless both the water ways and locks be enlarged, in which case the necessity for adherence to the present model would be obviated. As there is no probability that such enlargement will soon be made, inventors are very properly turning their attention to such changes in model as will obviate the washing of banks without reducing the carrying capacity of boats to any considerable degree.

To this end false bows, propellers, and paddle wheels placed in the bow, wings at the bow, longitudinal channels under the bottom, and many other inventions, have been made, some of them really accomplishing the end sought, as demonstrated by actual experiment.

We are not aware that the inventor of the plan under consideration has experimented upon so large a scale as to demonstrate the correctness of his theory, but he reasons that, as the usual blunt rounded bow tends to throw out the water from the center of the channel toward the bank, that any construction which will reverse this action will prevent the lateral swells, and allow an increase of speed to the desired limit.

The engraving shows the form of the bow of a boat, the lines of which are the converse of those of ordinary boats. The bow is introverted, forming a recess for the introduction of a paddle wheel or screw. By this construction the water will be thrown under the bottom of the boat and the displacement will be longitudinal instead of to a great degree lateral, as is at present the case with ordinary boats.

The stern may be similarly constructed if desired, so that the boat may run in either direction equally well.



HOOPER'S IMPROVED CANAL BOAT.

The invention was patented through the Scientific American Patent Agency, July 25, 1871, by Robert Hooper, of Baltimore, Md., whom address, for further information, at 20 South street.

Railways at $5,000 a Mile.

A wooden railway on the 4 feet 8½ inches gage is being constructed from the town of Sorel, at the confluence of the Richelieu river with the St. Lawrence, through Drummondville, to Arthabaska, P. Q., by Mr. L. A. Senecal, contractor. The Montreal *Herald* gives a long account of a recent trip on the line. Upwards of 2,000 men were at work, and the rails are laid on a large portion of the road. An experimental trip was made, the train going at the rate of 25 miles per hour, and running with remarkable smoothness. The journal quoted furnishes the following interesting particulars:

The ties, which are of hemlock and tamarac, are now brought down on trucks from the woods through which the railway runs; they are put on a rollway, run up to most ingenious circular saws, so gaged that at one operation they are morticed the proper depth and distance, not the difference of a hair breadth being found between one and another. As fast as they are cut, and the operation is very fast indeed, the prepared ties are rolled over to a different siding from that on which they were received, an ordinary circular saw sides them, and they are loaded up to be run out to the place where they are wanted. The wedges for keying up the rails are also prepared here. The rails are of maple, four by seven inches, and fourteen feet long, the gage of the line being four feet eight and a half inches. The cost of the line, in which cost are included stations, (nine in number), car and locomotive depot, engine and repairing shops, engine and tender, two passenger cars, eight grain cars, and twenty-five wood cars, is $5,000 a mile, in full for all but the Yamaska Bridge which cost $35,000. It should be mentioned that land damages, fences, etc., are included also in this amount. In payment it was agreed municipal and Government debentures should be taken at par, and nothing was to be paid except as work to the extent of $10,000 was finished.

The advocates of the uncomfortable narrow gage railways which they claim are so cheap will do well to take lessons from the foregoing.

The "Psychic Force."

As inquiries multiply, regarding the meaning of this new "dissonant consonant" term in scientific literature, we attempt a reply, which may quiet some inquisitive souls. To us it clearly implies that force by which jugglers or "prestidigitateurs" (by some called mountebanks) amuse the children. We must now, however, designate these gentleman Psychists, Professors of Psychism, and so on. The new term means, literally, Soul force. "What's in a name?"

It is already projected, by a reliable gentleman of scientific status, to establish a new society devoted to the study and practice of these arts. We protest against this new society, as we fear that, like all the rest of the romance of our childhood, the mystery, and therefore the charm, of the eggs fried in the hat, of the chicken hatched out in the "Professor's" mouth, and all that sort of miraculous and delightful thing, will in this way soon be sent in the track of most other mystic things of eld, and be reduced to mere stupid science, *if not* psychism. About these things we don't want to be enlightened. Even telephonic music, on an *accordion* or any other instrument, would please us more if we did'nt know how it was done.

We must ask, however, while on the subject, and whereas "animal magnetism" will be classed under this head, why the term "odic" force, of the celebrated Reichenbach, is not entitled to precedence. By the way, it seems to us that if this *be* thus, there is probably a peculiar, perhaps a lower, form or "mode" of this force, such as we may suppose exerted by fortune tellers, "seventh daughters of seventh daughters," advertised in the *Sunday Mercury*, and so on, which, by an application of principles of chemical nomenclature, we may designate as an *odious* force. However, we do not urge this latter discovery of *ours;* in fact, we withdraw it altogether, out of regard to the memory of the discoverer of paraffin, who, whatever his faults, doubtless possessed the *animus* and honor of a true scientist. *Semel insanivimus omnes.*

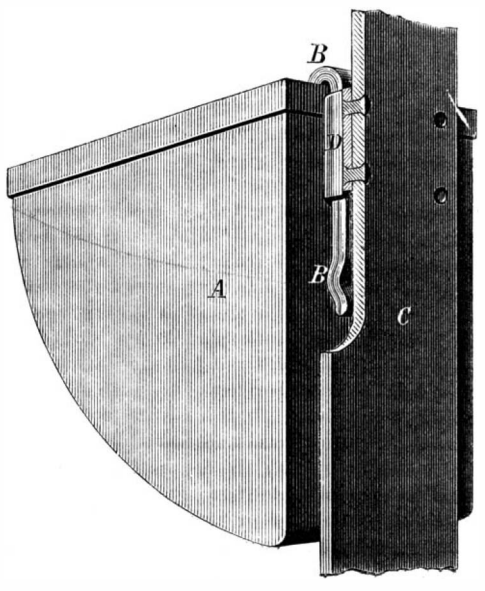
One more notion, and we have done with the new "force," we hope forever. "Clairvoyance" will be found to be "psychic" in its nature. We would respectfully submit to the new society (*in posse*) whether some astonishing cases of almost simultaneous publication, even in almost the same phraseology, of scientific discoveries and inventions, in two distant countries, have been due to "psychic" power or action? Some readers will acquit the present writer of absurdity in asking this question.—*Gas Light Journal.*

VITT'S IMPROVED ELEVATOR CUP.

A very simple but useful improvement is illustrated by the accompanying engraving. Its advantages will be apparent to all practical millers.

While the cup is made detachable, it is at the same time held with sufficient firmness, and the interior presents a perfectly smooth surface, having no rivet heads, nuts, or other projections which tend to produce clogging.

Referring to the engraving, A is the body of the cup from



the back side of which projects a bent strap or hook, B, formed by bending double a portion of the metal plate forming the cup, and then bending the doubled part downward and backward, and corrugating it near the extremity. The hook thus formed is slipped into a loop, D, made of metal plate attached by screws or rivets to the belt, C, as shown.

The corrugation near the extremity of the hook serves to prevent the cup from dropping out of the loop, D, when descending.

This improvement was patented through the Scientific American Patent Agency, August 15, 1871, by A. A. Vitt, whom address at Union, Mo.

AN English exchange gives a description of a new sanitary glove, to be worn by surgeons to prevent contagion during operations. It is stated to be especially useful in midwifery cases, wherein, as is well known, the hands frequently produce irritation by coming in contact with the mucous membrane of the patient. The possibility of making such a glove cannot be denied; but when the inventor claims, as the present one, Mr. J. R. Liston, does, that it will "leave the sense of touch unimpaired," he excites the wonder of his readers as to the material of which it is made.

Hall's Apparatus for Punching Paper for the Transmission of Telegraphic Messages.

It has been a desideratum in the transmission of telegraphic messages by means of punched paper, to secure some means by which the paper could be prepared accurately, easily, and rapidly. The invention of Mr. Isaac Hall, of New York (assignor to himself and George B. Walter, also of New York) is claimed to supply the needed facilities for this purpose.

In transmitting messages upon this system, which is the most rapid mode of transmission yet devised, a long narrow strip of paper is punched with small square or rectangular apertures of various lengths, the squares representing the dots in the Morse alphabet, the rectangles the dashes, and the unpunched spaces, between the apertures, the intervals between the dots and dashes as they occur in telegraphic writing. This paper being passed between the ends of the wires forming part of the circuit, or between devices of various kinds connected with the wires, allows the circuit to be made whenever the apertures coincide in position with the ends of the wires, and breaks the circuit when the unpunched portions separate the wires. Suitable mechanism is employed to move the paper at uniform speed, and the impulses are thus transmitted to the recording instrument at the station to which the message is desired to be sent.

The difficulty in preparing the paper has been one of the obstacles this system has met with, but Mr. Hall claims it is entirely removed by the use of his machine, which was patented, through the Scientific American Patent Agency, August 8, 1871.

As we cannot without drawings give the details of its construction, we will state merely that the machine, instead of punching each aperture separately, punches several at once, thus operating, it is claimed, about three times as fast as the method hitherto used. It is worked by keys, the punching not being performed by the power of the hand, but by machinery under the control of the keys, which latter are stated to act with nearly the lightness of the ordinary telegraphic signal key, so that the operator is not fatigued by continued work, as in other machines used for the same pur- pose.

It is greatly to be desired that the system of telegraphing referred to should ultimately surmount the difficulties it has encountered, and Mr. Hall's invention seems likely to prove useful in hastening this consummation.

A Race for Life.

The Lindsay (Canada) *Post* gives the following graphic account of a swamp fire: Though a swamp fire is not so bad as a prairie fire, it is yet formidable enough, as some Canadian gentlemen who were laying out the line of a railroad recently found. In the prosecution of their labors, they had penetrated the Long swamp about half a mile, when suddenly the attention of Mr. Tate, one of the party, was attracted by a loud roaring, as of the approach of a hurricane. On looking in the direction whence the sound proceeded, to his horror he observed fire rushing toward them at a rapid rate, licking up everything in its way and felling large trees in every direction. Mr. Tate ordered a stampede at once, and then began a race. At the start, the fire was fully 300 yards off; away rushed the whole party, white men and Indians, scrambling over logs, through brush heaps, tumbling headlong into holes, barking shins, spraining ankles, scratching hands and tearing clothes, but not a word was spoken, no stopping to look back, or asking for companions in the rear, but each one struggling to reach the clearing. Owing to the denseness of the swamp, though every muscle was strained, progress was like a walk compared to the rapid march of the fire. Fortunately, they reached the clearing in safety, but not a moment too soon, for the fire was but ten feet behind them when they emerged from the woods; had they delayed a minute longer before starting the probability is that they would have lost their lives.

Model Railway Management.

On the Michigan Central road, for over sixteen years past, not a drop of blood has been drawn from man, woman or child inside the cars, and just now the *modus operandi* is especially important. At all hours of the day and night there sits an operator in the Kalamazoo station (midway of the line), who receives telegrams from each train on the road the instant it enters or leaves a station, so that he holds or starts it at will. His eye is literally on the entire line continually making a collision next to an impossibility, and the immense single track quite equivalent, so far is safety is concerned, to the double track roads. The twelve and sixteen wheel coaches, admitting of the breaking of almost any one of the wheels without disabling the truck, constitute also a no small item in this aggregate of immunity from peril.—*Railway Times.*

IN the third paragraph from the end of our article in issue of September 16, describing Parrot and McCauley's filter, the letter G should be substituted for H, in describing the outflow in cleansing the filter. In the third paragraph, the partition M is once referred to as the partition B, but this will lead to no misunderstanding as to the working of the filter.

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Correspondence.

The Editors are not responsible for the opinions expressed by their Correspondents.

Proposal for a Paine Fund.

To the Editor of the Scientific American:

My late silence in regard to the alleged invention, or rather discovery, of Mr. Paine, was only caused by the fact that my mind was occupied with the subjects I intended to bring before the meeting of the American Association for the Advancement of Science, in Indianapolis, and my absence from New York, but by no means by any intention to drop the subject, or any thought that Mr. Paine's reply could be considered sufficient or satisfactory. To the contrary, it is evident, from these replies, that Mr. Paine dodges the main points, and only gives a weak answer to some side issues, not essential to the grand controversy, which is: 1. That the world knows nothing in regard to the mechanical power of zinc under combustion in a battery; and 2. That Mr. Paine's electromotor recently on exhibition in Newark, was a *bonâ fide* electromagnetic engine, producing the power displayed, solely by the consumption of the trifling amount of zinc mentioned.

I consider the proposition of Mr. Smith, made in the SCIENTIFIC AMERICAN of September 16, namely, to give Mr. Paine $500 if he proves these points, a most excellent plan to settle this matter, which, by the course adopted by Mr. Paine, is now degenerating into a mere pen and ink controversy, which can do no good to the progress of science, but only serve the selfish ends of stock speculators. Therefore I join Mr. Smith, and as a former unsuccessful seeker after economical electromagnetic motive power, I consider the matter important enough to contribute my mite. I therefore offer another $500 to Mr. Paine if he proves his assertions satisfactorily; and I invite all those who are or ever were searchers in the same field, or who take interest enough in the advancement of theoretical science, or in the progress of industry, or in the preservation of human life secured by a safe substitute for the steam boiler, to come forward and follow our example. Let each of those offer $500, so that Mr. Paine, if he really has done science and humanity the service his alleged discovery imports, be properly remunerated. I, for one, will not regret my money, because if the discovery be genuine, Mr. Paine deserves fully the fund of $50,000, which would be soon brought together, if only one hundred persons joined in this way.

I hope that this, my proposition, will find many followers, also, for a national and patriotic motive. The readers of the SCIENTIFIC AMERICAN have seen in the last number, page 199, that an Englishman, the Rev. Mr. H. Highton, makes the same assertions as Mr. Paine, and is snubbed by the British Association, who refuse to hear his paper; and now the New York *Times* comes forward and invites Mr. Highton to come to America "to explain to receptive audiences, that what with scorn was put away by the great British Association."

No doubt but Mr. Highton can find here, as well as in England, promiscuous audiences of incompetent hearers, who listen to his papers, as well as Mr. Paine finds readers for his articles on electromagnetism; it is, however, very doubtful if the American Association would be more willing than the British, to have its time occupied with such papers—at least, the committee of three for the adoption of papers to be read before the recent convention in Indianapolis, of which committee I was a member, refused about a dozen papers, and surely would have refused papers such as Mr. Paine or Mr. Highton would offer.

We do not want to lose time by having papers read or articles printed, containing unproved assertions, at variance with and in contradiction to physical laws established by experiment; but we are each willing to give $500 to the man who proves that the laws, which we thus far have considered well established, are erroneous or misunderstood; we do not want talk, but facts.

In some of the latest articles of Mr. Paine, he complains of persecution, as if he were a second Galileo; he wants to be let alone, like the Southern Confederation during the latter part of our civil war. But this will not do, Mr. Paine; the matter is too important. We will not let you alone; you must prove practically that you are the great discoverer you pretend to be, and cut out that Englishman, before he accepts the invitation of the New York *Times*, and comes this way; then you will receive the $50,000, perhaps $500,000, you would deserve so well; and we will have the honor of compensating American genius.

No more promises of what you are going to do, or may demonstrate, will be accepted; you must either practically prove your point, and receive your money, or keep still and ——not bother us any more. P. H. VANDER WEYDE.

New York city, Sept. 17, 1871.

Strength of Boilers.

To the Editor of the Scientific American:

In order to show tangibly what pressure a boiler may bear under some circumstances, I enclose you a piece taken from a boiler at the works of the Otter Creek Coal Company, where the water is of the worst quality—corrosive. The boiler had been carrying a pressure of from 20 to 30 pounds until within four days of the bursting, and had a pressure of not less than twenty pounds when it gave way, gradually and without explosion.

Another case I have to mention is of a boiler in Pittsburgh, Pa., which gave out quietly under a pressure of 90 pounds. Upon examination, the mud drum was found to be literally eaten up with rust, and was not thicker than brown paper in places. I could (and did) punch a file tang through it with one hand, yet that boiler did not explode.

How then shall we account for the *Westfield* explosion on any other theory than the instantaneous generation of steam, which theory is generally only understood by experts? Why then should the ferry company and engineer be accountable, who may (in all probability) never have heard of this theory?

Brazil, Ind. C. W. CRAWFORD.

[Since the above letter arrived, Mr. Crawford has informed us that the boiler in question was about 36 inches in diameter, and 24 feet in length. The specimen he sent was taken from the patch which had been put on the boiler about four months before the bursting, and is a piece of much corroded iron, in places not more than one thirtieth of an inch in thickness. Mr. Crawford attributes the corrosion to the water, which is drainage from a mine, and may be impregnated with sulphur. —EDS.

Canal Navigation---Its Difficulties.

To the Editor of the Scientific American:

I have not been an uninterested reader of the several articles published by you from time to time relative to canal navigation. Indeed the subject occupied my attention long prior to the passage of the law offering a prize for a "device" adapted to the purpose, and an improvement upon the present method; and allow me to state some of my conclusions why the navigation of our canals at more than moderate horse speed has become impracticable, and the remedy or improvement.

They are arbitrary causes: 1st. The dimension of locks. 2d. The necessity of carrying a certain amount of freight to pay expenses, increased in order to afford a business profit to to the carrier. 4th. Volume (depth and surface) of water in the canal, with present build and model of boats preventing propulsion or towing exceeding one and a half to two miles miles per hour. Now these are physical difficulties not easy to be got over, by theoretical ideas as to manner of propulsion or application of any known motor or power.

As to books, ask a scientific and practical ship builder or marine architect what are the principles of that art in modelling a craft or boat for speed and easy propulsion, and the answer will be, length with water lines giving a sharp prow, and the least possible breadth or beam requisite for buoyancy. If for burden, what then? Increase of breadth or beam. Thus it is, to attain burden, confined to dimension of locks, the present canal craft has been built or modeled entirely for burden, and disregarding every principle of marine architecture or science, until they have become boxes 96x17, 8 feet deep, corners rounded; and the next thing is to load down this big box within one foot of the canal bottom, in a body of water confined within a bench wall to forty-two feet surface, and attempt to propel or drag 245 tuns cargo through this body of water up to a speed of three or more miles per hour: which is another physical impossibility, from the fact of insufficient depth of water and the bad shape of boat carrying the burden, forcing the body of water forward, and the greater speed attained, the larger the volume of water forced, the result grounding the boat on the bottom This is simply the effect of natural causes, to wit, the resistance and density of water. What, then, is the remedy, or how shall we produce a craft to avoid the resistance of water and attain the desired end? Ask a ship builder if he can model a craft, irrespective of lock dimension, that can carry 245 tuns, and be propelled five or even ten miles through the water, and the answer will be: *Certainly!* give length and proportionate breadth as wanted, and it will be produced; and herein comes a solution of the difficulty. Return to or observe, in the model of canal boats, the recognized principles of ship building or naval architecture, and the craft is produced. Model with a due regard for speed as well as burden, and all difficulties as to towing or propelling boats five to ten miles vanish, provided power be furnished commensurate with the burden borne and resistance to be overcome. But just here come up expense and remuneration, demanding or requiring that the cargo or burden be carried, or canal navigation is impracticable or nonpaying. Well, the locks are too small. Yes, but they are as they are; *ergo*, speed must be sacrificed for burden; model of boat disregarded, for every inch of floating surface is required, and the result is a floating box, carrying sufficient burden to pay expense and some profit; but the model of the boat such as, with the depth of water to float one and a half to two miles towage can only be attained. Now all attempts to get over or around these facts and known principles are futile. They exist, and all theories for overcoming or obviating them are visionary and impracticable, so long as confined to present dimension of locks and build of boats, and an arbitrary or fixed amount of freight to be carried; but give length to present boats, and it becomes practicable.

A recent writer, upon the subject of propelling boats, in your paper asks this pertinent question: "Why not use steam?" and I ask, what better or more efficient motor power have we than steam? But there is difficulty in its proper application, to which, with your permission, I will allude. The present application of steam power is with the submerged propeller wheel, in very many respects, no doubt, the best propelling contrivance known, and only one objection can be urged against its use on the canal, and that is this: The action of a propeller wheel with its required velocity of revolution, attached to a boat loaded and drawing six sevenths of the water of the canal, is to paw (if I may so speak in this connection) away the water from the stern, while the shape or model of the boat (stern being full) has a tendency to drag water, and the action of the wheel, to displace it from the stern and let it settle, and thus the boat grounds. The greater the power applied to the propeller wheel to increase speed, the greater the displacement of water by increased revolution of wheel, and the result is as before stated. Another seeming objection to the use of a propeller wheel on the canal is that it is submerged, and its action on the water is at the bottom, whereas in canal navigation the propelling power must be exerted on the surface or top of the water, like the common steamboat wheel, without its disturbance of the water, if possible, as I think it is.

Thus much for propelling agent and motor power. I turn now to the form or model of the boat carrying the burden. Unless some device be brought out restoring the form of boat to conform to true principles of naval architecture in the model, and combining speed and burden, under whatever system of towage, increase of speed on the canal will be a failure, and it is true the present model of boats is only adapted for horse power towing.

A writer in your journal speaks of an "adjustable bow," but pronounces it "impracticable," and herein he is mistaken. That device is the only thing which overcomes the difficulties, for it restores the form or model of the boat back to true and scientific principles of ship building, and allows the burden part of the boat to remain as at present, filling the entire capacity of the locks when passing through, and when out, adding or affording the requisite form necessary for speed. This with steam power applied by a wheel or propelling agent, exerted on the surface half of the water, or proportionate, as the burden carried requires, or the speed desired, and there will be no more difficulty in carrying 245 tuns burden (for that is the *maximum* amount with suitable build of boat that can be floated upon a surface of water 96x17 and 6 feet draft of water) and attaining five to seven miles speed per hour than there now is by horse power one and a half miles.

The question of damage to canal structures and banks I consider disposed of, and not to be taken into consideration, inasmuch as by recent declaration of the canal commissioners, that is not to be regarded in the competition for the offered reward. E. C. BANCROFT.

Syracuse, N. Y.

The Psychic Force.

To the Editor of the Scientific American:

As I read your interesting paper with much regularity, I am well acquainted with the attainments and reputation of Dr. Vander Weyde; and my knowledge of his fairness and candor has caused me much surprise at his letter in your issue of last week. Of the ingenuity of Mr. D. D. Home, we are all aware, and some people call him very strong names; and Dr. Vander Weyde's remarks on *léger-de-main* and jugglery are all to the point. But when he asserts that the "wire cage serves to hide incidental means of support," and that "a spring balance may be made to indicate an increased weight, by having a small electromagnet hidden inside, which, by the simple contact of a metallic point, in the wooden lever, is brought into metallic connection with a hidden battery," I think he is attributing, to Mr. Crookes and the two other gentlemen, an amount of obtuseness that is no characteristic of either of them.

Mr. Crookes distinctly says (and he is trustworthy) that he called for Mr. Home, and saw him change his dress, and can state positively that no machinery was secreted about his person. Moreover the apparatus was constructed and arranged without Mr. Home's supervision, and that "medium" was not aware of the object of some parts of it when he sat down to exhibit his powers. The object of the cage was obviously to prevent Mr. Home from touching the accordion with his feet.

Dr. Vander Weyde's theory of *léger-de-main* may be the true explanation of these singular feats which have deluded Messrs. Crookes, Higgins, and Cox: but I think Mr. Crookes' statement that he prepared the apparatus without Home's knowledge is entitled to credence. If jugglery underlies these manifestations, by all means let it be unearthed; but if this be done, it will be by plowing far deeper than Dr. Vander Weyde has done in his letter of August 12. B. D.

Jersey City.

A Simple Alarm Clock---A Boy's Invention.

To the Editor of the Scientific American:

I send you a description of a simple contrivance, which may be useful to some of your many readers, especially since it has to do with the all important subject of "early rising." Take a common weight clock, and have a small hole in each of the boards that support the works inside, in any convenient place near the hammer. Having attached a small wire or string to the wire that makes the clock strike, in regulating, pass it through the holes and under the time weight, through another hole in the case to the outside, where, having secured it, you have an alarm clock that was never intended as such. The time weight, in descending, will press on the string, and make the hammer strike until the other weight runs down. To set the alarm the time weight must be gaged in winding, as it descends about ½ inch in three quarters of an hour. This is a boy's invention. It will wake a person without frightening him, which some other alarms will not do.

Randolph, Mass. PUER.

The importance of petroleum to the commerce of the United States may be judged from the fact that it is now exported to a greater value than any other product, with the exceptions of bread stuffs and cotton. The value of the exported petroleum in the year 1870 was nearly $36,000,000.

IT is estimated that America, when her productive power is fully developed, will be able to feed four times as many persons as there are now on the face of the earth.

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Testing Boilers by Hydrostatic Pressure.

OFFICE OF U. S. LOCAL INSPECTOR OF STEAMERS,
No. 23 Pine St., New York, Sept. 15, 1871.

To the Editor of the Scientific American:

My attention has been directed to an article in the edition of your paper of Sept. 2nd, signed by a Joseph A. Miller, of Boston, Mass., headed "Steam Boiler Inspection," in which he refers to a report of a Commission appointed by the Parliament of Great Britain, in reference to the responsibility of owners of steam boilers. He also alludes to the *Westfield* case and the testimony of the Government Inspector (which is a matter of record) finally concluding with the question (using his own language): Can a boiler be tested, as stated in the testimony of the Government Inspector?

I would state for the information of the above named individual, that it is not only possible but entirely practicable to test a boiler to any given pressure,—no matter what the pressure of the fountain head may be, whether it be sixty, one hundred, or two hundred pounds to the square inch.

In the first place, the boiler is filled, the safety valve being open; when full, the water is shut off. The valve is then lowered to its seat, the water is then turned on slowly, and when the pressure required is indicated by the gage, it is shut off instantly.

In the second place, there is a safety valve attached to all boilers which can be raised, and so relieve the boiler, when the pressure has reached the proper point.

In the third place, all boilers have blow cocks attached to them (where men are stationed), which can be opened when the pressure has reached the required limit, and so relieve the boiler from any undue pressure.

In the fourth place, the main valves of the engine can be lifted from their seats, thereby relieving the pressure on the boiler.

If Mr. Miller was a practical engineer, or was possessed of a fair share of common sense, this explanation would not have been necessary. I therefore conclude that he belongs to a numerous class, who voluntarily rush before coroners' juries to give testimony, in order that their names may appear in the newspapers, thereby advertising themselves and those who employ them, even at the risk of exposing their ignorance.

But it is to be feared that knaves and fools will exist with the human race.

JOHN K. MATHEWS,
U. S. Local Inspector, New York.

Uniformity in Rails.

To the Editor of the Scientific American:

At the annual reunion of the Car Builder's Association, held this year at Richmond, no subject received more serious discussion than that pertaining to an adoption of a basis of uniformity in respect to the construction of cars and the manufacturing of rails.

Regarding this latter subject, I have an idea to advance, which, if carried into practice, I sincerely believe will result in much good to both manufacturer and purchaser.

No one but a person initiated in the mysteries of the manufacturing of rails can conceive of the multitudinous number of shapes, forms, and varieties which the market calls for.

Now if the bevel under the head of the rail and the bevel on the flange were the same, so that the fish bar would fit the rail either side up, this great variety of forms and shapes might very readily be dispensed with, and an uniformity adopted, which would prove greatly advantageous to manufacturer and purchaser, and in turn to the general public.

Of course there will be different hights to rails, but this matters very little. I also feel confident that if the above plan be generally adopted, the fish bar will be rendered much more effective.

JOHN H. SNYDER.
Richmond, Va. Supt. Tredegar Iron Works.

Up a Mountain by Rail.

The London *Daily News* prints the following interesting description of the railway up the Rigi:

"I have been up the Rigi Railroad. This morning, at eight A. M., I embarked in a boat for Viznau. On my arrival there, I and about two hundred fellow passengers found ourselves standing before a small station, with the mountain towering above us. A notice stated that only sixty passengers could be forwarded by each train, and that first come would be first served. Behind a small window sat a Swiss maiden. For about a quarter of an hour the window was closed, and we had an opportunity to contemplate her features through a pane of glass; then it opened, and she proceeded to give out tickets. Anything more slow and methodical than that maiden it is impossible to conceive. The issue of each ticket was a labor of several minutes. As soon as sixty were issued the window was closed, a train was started, and then, after an interval of about ten minutes, the maiden reappeared, and commenced slowly dealing out a second sixty. I got a ticket for the third train, and soon afterward found myself seated in a carriage containing nine benches, each of which accommodated six passengers. For an hour and a half we proceeded almost, as it appeared to me, perpendicularly up hill, at the rate of about three miles an hour. The motion was not more uncomfortable than is usual with railroads.

"The railroad is not yet completed to the summit of the mountain. At a place called Staffelhohe the passengers have to get out and pursue their expedition on foot. As this does not occupy above half an hour, it is not very fatiguing. By four P. M. I was back in Lucerne, having breakfasted and passed three hours gazing with deep interest at the wonderful panorama beneath my feet, which consisted of a mist. The Rigi Bahn Company must be making a good thing of their speculation, to judge by the number of passengers which they convey. There has been, I am told, during the season a daily average of about five hundred; and I can vouch for it, that the boats to and from Viznau are so crowded that it is almost impossible to find a place to sit down on them."

Vegetable Cutter.

This is an ingenious machine for slicing and cutting vegetables, apples, etc. It consists in an adjustable rotating disk wheel, carrying adjustable knives or cutters, and an inclined hopper, in connection with the wheel.

This machine is ordinarily attached to the projecting edge of a table or other fixture by means of a set screw. A disk wheel is rigidly attached to a shaft, which revolves on a point or step through a bucket or arm of the frame. The point is made adjustable by means of a screw, by which the shaft is raised or lowered for the purpose of adjusting the knives to the cutter plate or bit on the bottom of the hopper. The knives are adjustable in slots through the wheel by means of screws (one or more) in each blade, the screw or screws passing through a slot or slots in the blade. A straight edged cutter takes a smooth slice from the potato, apple, or vegetable. Vertical cutters pass through holes in the wheel and cut slits in the vegetable, so that the knife which follows in the rotation of the wheel will slice off and leave the vegetable in narrow strips, when such a form is desired, for soups, etc. The knives or cutters are readily removed, so that a greater or less number may be used.

The apples, potatoes, or other vegetables, are fed into the hopper with one hand, while the wheel is revolved with the other, almost any form or thickness of slice being produced in the most perfect and rapid manner. The machines may be constructed on a larger scale, and driven by steam or other motive power, for cutting vegetables, as turnips, carrots, etc., for feeding stock. In the great saving of time and in the accuracy with which its varied operations are performed, this vegetable cutter is believed to be unrivaled. Gideon B. Massey, of New York city, is the inventor.

Epergnes for Fruits and Flowers.

This invention consists in a mode of connecting the stand and bowl, also the bouquet holder, which are made in separate pieces by molding or pressing, by means of thimbles, a screw bolt, and elastic washer or cushion, in such a manner that the several parts are detachable from each other, thereby saving labor in the manufacture, and saving vastly in the labor and space occupied in packing for transportation; also, securing a degree of elasticity which lessens the risk of breaking. If any part should be broken, it can be replaced by another, while in the ordinary way of making them a fracture of either the leg or the bowl destroys the whole.

Heretofore glass épergnes have invariably been blown or hand made, owing to the great difficulty, if not impossibility, of successfully making them by pressing, and attaching the bowl and leg together permanently, with a hole down through the center for connection of the bouquet holder, and, if drilled after being attached, in ordinary bowls the glass is liable to fly either during or subsequent to the process of drilling, while either the leg or bowl can be safely pressed separately with a hole in each, or the hole may be afterward drilled through each separately with safety, and the two attached. They can thus, it is claimed, be made very much cheaper by pressing separately and connecting afterward than by the hand process.

In the case of these articles being made with two bowls, one above another, as they often are, the joint of the upper one with its stand, which rests on the lower bowl, will be made in like manner, one long bolt answering for both, passing up entirely through the stand of the upper bowl.

When they are made without the bouquet holder, the bolt, having a broad flat head, is put down through from the top, a nut screwing on to it in the bottom of a socket.

Samuel S. Barrie, of Green Point, N. Y., is the inventor of this improvement.

Spread of Small Pox by Contagion.

In London recently, an officer appointed to take charge of the effects of a poor man who had died of small pox, pawned the clothes and sold the ticket to a man who redeemed the pledge, and took the garments. His wife caught the disorder and died a few days after.

It is no uncommon thing for poor people to dispose of infected clothing and bedding; they dare not keep it, and cannot afford to throw it away. It has been suggested that sanitary regulations should provide for the reimbursement for the loss of clothes, etc., of such persons, whose poverty makes them, in sickness, a source of great danger to their neighbors.

CUNDURANGO—the new plant—whose extract or decoction is said to effect such wonderful cures in cases of cancer, has been analyzed by Dr. Antisell, chemist to the Agricultural Bureau at Washington. The doctor finds the ratio of the wood to the bark to be as 50·28 to 49·72. The centesimal composition of the bark was as follows: Moisture expelled at 212 Fah., 8; ash matters or mineral salts, 12; vegetable substances, 80. The vegetable matters were separated and found to be composed as follows: Fatty matters, soluble in ether and partly in strong alcohol, 0·7; yellow resin, soluble in alcohol, 2·7; gum and glucose from starch, 0·5; tannin, yellow and brown coloring matters (extracted), 12·6; cellulose, lignin, etc., 63·5; total, 80. No crystalline alkaloid could be detected, and, according to the above results, the therapeutic position of the plant must be among the aromatic bitters.

INAUGURATION OF THE MONT CENIS TUNNEL.

This enterprise, remarkable even among the many engineering triumphs of the present day, was formally opened by a grand ceremonial, on Sunday, September 17th. We have taken pains to keep our readers informed as to the progress of the work and the details of its construction, and therefore need not recapitulate the ingenuity and perseverance of the engineers, and the difficulties they so courageously overcame.

The immediate effect of throwing open the tunnel is to bring Turin within 18 hours travel of Paris, and to relieve the journey of the long, wearisome, and often perilous ride by diligence over the mountain. But, as with other great undertakings, there will be many accessory and collateral advantages to the commerce of the world, which time alone can develope, and of which the most obvious is the establishment of Brindisi, on the eastern coast of the Italian peninsular, as the chief European port for the commerce of the East. There will soon be unbroken lines of railroad from Paris and the channel ports, Havre, Calais, and Boulogne, to Brindisi; and the traffic to the East Indies and China, viâ the Suez Canal and the Euphrates Valley Railroad will, no doubt shortly quit Marseilles for the more approximate Italian port. In view of this fact, the French authorities are supposed by some critics to have looked somewhat coldly on the tunnel, and they have not yet completed the railroad leading to it. This important link in the chain of communication will, it is expected, be open in November next. The journey from Calais to Brindisi will then take only sixty hours time, and that from London, about sixty-four. The railroad approaches to the tunnel on the Italian side have long been complete.

The solidity of the work, and the perfect ventilation of the enormous excavation, elicited expressions of admiration and surprise from the large party who attended the opening ceremony, which included many of the most distinguished men from both countries. On Tuesday the 19th, the municipality of Turin gave a grand banquet in honor of the occasion. Two names, which would have been prominent in the list of visitors, must have been remembered with pain by every one present. The great statesman of United Italy, Count Camille Cavour, gave all the weight of his talents and influence to the furtherance of the work; and to Germano Sommellier is due the credit of originating the idea, of fighting for it against all obstacles for twenty years, and of finally completing it, to the satisfaction and wonder of the world. Both these men are gone; but they have left us an enduring monument of their far-seeing wisdom, and indomitable courage and genius.

Trains are now running regularly through the tunnel, the subterranean transit occupying twenty minutes.

In alluding to some rumors of accidents in this work, *Engineering* states that there has never been one stone displaced from the finished arch of the Alpine tunnel, the work of which is so solidly constructed that it is well nigh as durable as the rocks themselves. The only circumstance which served as a formation for these absurd reports was the falling in of eighteen or twenty feet of work, which happened in the last days of June, at the Bardonneche end, in consequence of the falling of some scaffolding broken by the explosion of a blasting charge.

The total cost of the tunnel is represented to be some $13,000,000, or 65,000,000 francs; of these 20,000,000 francs are to be contributed by the Victor Emmanuel Railway, or Railway of Northern Italy. This sum is to be paid on or before the opening of the tunnel. The French government was to pay 19,000,000 francs if the work was accomplished within twenty years, reckoning from 1862. But if the work was accomplished at an earlier date, France bound herself to pay 500,000 francs more for every year gained upon the stipulated time. As there have been eleven years thus gained, France will have to pay 5,500,000 francs besides the 20,000,000 of the original stipulation. She has besides to pay 5 per cent interest on the money due for the work as it proceeded from year to year. Thus Italy will pay something less than 20,000,000 francs. Had the construction of the tunnel continued beyond the stipulated term of twenty years, Italy would have lost 500,000 francs for every year in excess of that period.

DEATH OF PROFESSOR D. H. MAHAN.

We regret to announce the death, by suicide, at the age of 70, of the distinguished professor of military and civil engineering at West Point Military Academy. He had been visited by a long period of mental depression, and was on his way to New York to seek medical aid, when a sudden frenzy impelled him to leap from the steamboat and drown himself in the Hudson. This sad act deprives the country of a most valuable officer, who has long been the animating spirit of one of her most important institutions. It is stated that the recommendation of the West Point Board of Visitors, that he should be placed on the retired list, had contributed to the affliction which drove him to end prematurely his useful and honored life.

THE "OCEAN WAVE" DISASTER.—We hear from Mobile, Alabama, that Coroner Paine has caused the arrest not only of the owners of the ill fated boat *Ocean Wave* but also of the United States Inspector of Boilers, E. P. Sprague. If a verdict can be obtained against, and due punishment meted out to, a few delinquent officials appointed by the Federal Government, there is hope in the future that responsibility of an office holder is not a myth, and that nothing but a proper administration of laws already in existence is required to defend the lives of the public from the recklessness and ignorance of boiler owners, and of the functionaries who are set to be a check upon them.

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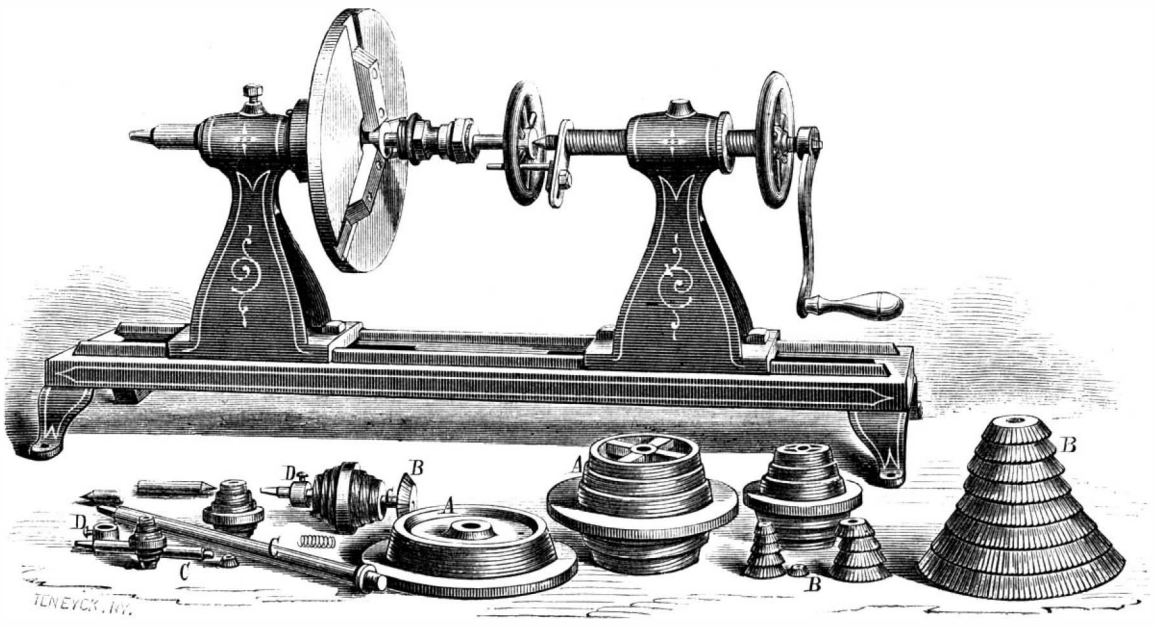
Improved Valve Fitting Machine.

One of the most practical and useful improvements we have lately had the pleasure of presenting to our readers, is that shown in the engraving which accompanies this article. By it steam valves can be refitted without taking them to a machine shop, and their seats may be fitted without removal from the pipes to which they are attached. Both operations are performed easily, rapidly, and accurately, by any person possessing only slight mechanical skill; and it is safe to say that the machine will pay for itself in a single year in any establishment where a large number of valves is in constant use.

The portion of the apparatus intended for refitting valves is a small lathe, having a bed plate with guide rails, upon which the heads slide, in their adjustment, to and from each other. The head at the left of the engraving carries a hollow spindle to which a face plate is attached, as shown. In the center of this plate is a steel center pin which rests against a coiled spring in the hollow spindle, its use being simply to center the valve previous to cutting it.

The face plate carries these cutters, as shown. These cutters are beveled alike at each end, but have each only one cutting end. Only one at a time is used as a cutter, the smooth ends of the other two being presented to and caused to bear against the valve in cutting, to steady it while the cutting proceeds.

Various lengths of centers are used in the hollow spindle in fitting winged valves, etc., a circular piece in the center of the face plate being removable to admit the wings or spindles of such valves, and allow their bearing faces to meet the cutters.



HALL'S MACHINE FOR FITTING STEAM VALVES.

The centers, resting on a coiled spring in the hollow spindle, retreat as the valve is fed up to the cutter, but hold the valve accurately to center while the cutters are brought down upon the valve, where they are fixed by set screws.

At the opposite end of the lathe is a spindle with feed screw, the spindle carrying a center which centers the valve stem. A dog screws on to the end of the spindle and engages with an arm of the hand wheel on the valve stem. The spindle is turned by a winch.

The valve being placed in the lathe, and the parts adjusted as described, five or six turns of the winch, with the proper feeding up, will dress the valve to a true bevel. The center in the hollow spindle is then held from retreating further by a set screw, and a few turns more burnishes the valve upon the smooth ends of the two reversed cutters.

In fitting the seats of globe valves, screw guides, A, are used; each—except the largest—having six different threads to suit various sizes of stuffing boxes, and there being enough of these guides to fit all the threads in use, from six inches down. Burrs, B, of various sizes are screwed on to a stem, C, which stem passes through one or other of the guides, as the case may require. The stem is turned by an ordinary bit stock, or a ratchet drill stock, or, in case of very large valves, by a press drill stock.

When the cutting is done, a collar, D, is slipped on to the stem, C, and slid almost up to the screw guide, leaving a very slight space for further advance of the stem. A few more turns then burnishes the surface of the seat, leaving a perfect finish.

Its merits are at once seen upon inspection, and it has been purchased and is now used in hotels, manufactories, large stores, and, in short, in all kinds of establishments where steam is used either to heat the buildings themselves or as a conveyer of heat to liquids, as in dyeing, tanning, etc.

The machine illustrated is the largest size; smaller ones of less capacity and much cheaper in price, are manufactured.

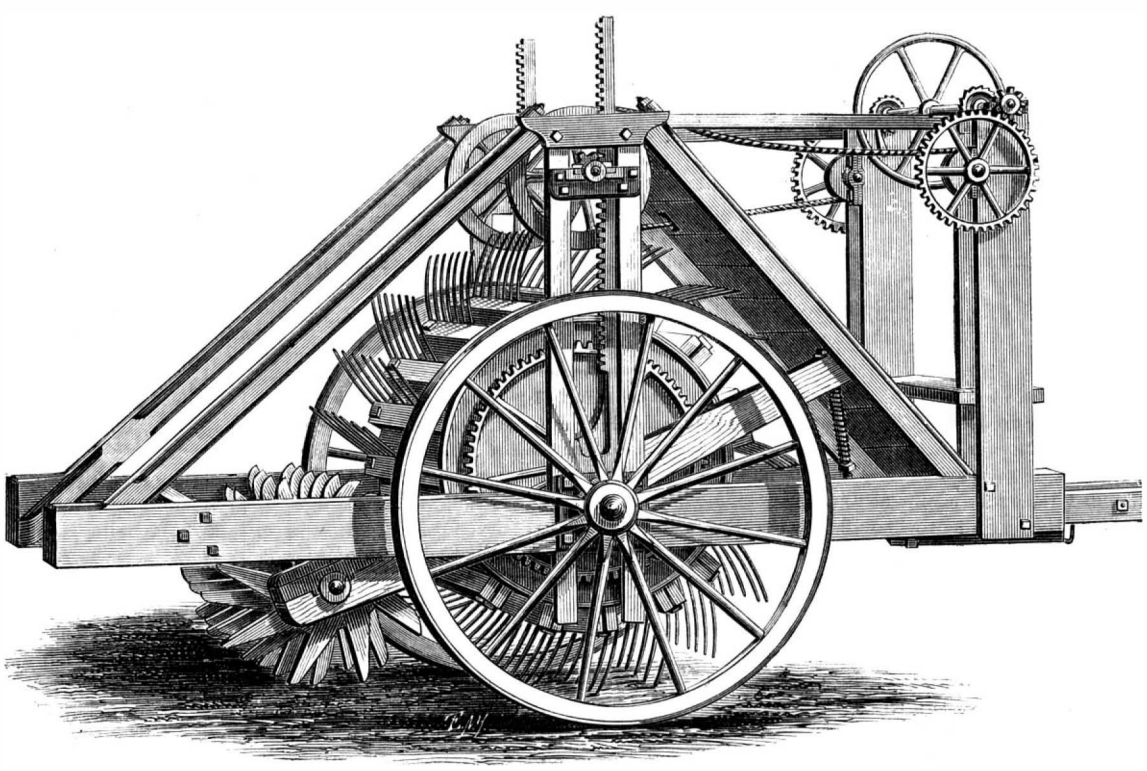
This machine is covered by Letters Patent bearing date Aug. 1, 1865, Dec. 10, 1867, and March 8, 1870; reissues, July 7, 1868, and Sept. 28, 1869.

It is now on exhibition at the Fair of the American Institute, and may be seen at the office of C. F. Hall & Son, 21 Murray street, New York, whom address for further information.

Improved Pulverizer.

Experience has shown that the best time to cultivate the soil is before the seed is put in the ground. The surface soil is usually the most fertile. Hence, in pulverizing the earth, it is not desirable to invert the soil, as is done in the common operation of plowing, but rather to stir up and mix the soils to the desired depth. To this is due the great superiority of the digging process in the production of crops.

The machine herewith illustrated is intended to dig up and thoroughly pulverize the soil, and prepare it for the reception of seeds of every kind. It consists of two cylinders, supported by suitable framework, and carrying wheels, so geared and combined that the revolution of the foremost cylinder imparts a rapid revolution to the rearward one. The foremost cylinder is armed with teeth, which enter the ground be the weight of the machine, and, as it revolves, dig up the earth. The rearward cylinder is armed with cutting teeth, which play between the beforementioned teeth and knock out and pulverize the earth presented to them.



THE PULVERIZER OR "DELAWARE DIGGER."

The teeth of the foremost cylinders are of the bayonet form, but of such a peculiar curve that, as the cylinder moves forward, and as the teeth penetrate the soil, they continue to coincide with the first point of penetration until the entire tooth has penetrated, or as much of it as is necessary to dig any required depth.

It will be seen that, as the teeth penetrate the soil, there is no drag on the latter, the teeth, in passing, entering precisely as does an ordinary spade in the hands of a gardener. The effect upon the soil, as it leaves the teeth, differs entirely from their action in penetrating the soil, for, after the penetration of the teeth to the required depth, and on the continued forward movement of the cylinder, the teeth immediately commence to raise the soil abruptly, as the gardener raises the soil with his spade.

The exact curve of the teeth depends on their length and the diameter of the cylinder to which they are attached, and is described by a point in a plane rolling on a cylinder. The form of the teeth and the method of attaching them to the cylinder are both covered by a patent. This is really the best use to which bayonets have ever been put.

The cylinders may be geared by any means whatever, and may revolve in the same direction or the reverse. They clear themselves better of rubbish when they are reversed.

The cylinders are lifted clear of the ground by means of a sliding rack, which is operated by a pinion near the top of the king posts, in connection with the ropes and hand wheel, as shown; or cranks can be used instead of a hand wheel

By reversing the motion, the cylinders are lowered, the teeth forced into the earth, and, in turn, the carrying wheels are lifted clear of the ground.

This machine is claimed to do its work well, thoroughly pulverizing even heavy clay soils. It is particularly adapted to steam culture. It is the subject of several patents, the earliest bearing date March 19, 1861.

Any further information concerning this machine will ab furnished by Geo. G. Lobdell, of Wilmington, Del.

Hydraulic Hoisting Apparatus.

A new apparatus for elevating and lowering platforms in hotels or warehouses, by means of water, designed to utilize the entire force of the water, and occupy a small compass has been invented by Mr. Albert Lucius of New York city The invention consists in the combination, with a hydraulic cylinder, of a piston, toothed rod, gear wheels, and winding drum. The horizontal hydraulic cylinder is closed at the back end and open in front. A piston, properly packed, is connected with a piston rod, which is constructed as a rack. This gears into a pinion hung in bearings cast to the front end of the cylinder in form of lugs. The arbor of the pinion carries a drum of large diameter, to which the hoisting rope is fastened, and around which it winds. A roller, hanging also in the lugs, bears against the smooth face of the toothed piston rod, and keeps it in constant gear with the pinion. The water is admitted at the back end of the cylinder, through a pipe, which is closed by a suitable valve. This valve is connected with a rope, extending up along the hoist way, so that by pulling it the water may be admitted A water discharge pipe connects also with the back end of the cylinder, and has a valve which can be opened by a rope.

The operation of the machine is as follows: In opening the induction pipe, water is admitted to the cylinder behind the piston, pushing the latter forward, and causing thereby the rotation of the drum and the winding of the rope which elevates the platform. When both pipes are closed, the water will be confined with the cylinder to retain the piston, drum, and platform in any suitable position. When the discharge pipe is opened, the water gradually escapes.

To Cheesemakers.

The following groan from England, regarding the introduction of American cheese into their market, we find in the September number of the *Milk Journal*: It says:

We would draw especial attention to our report of the cheese market this month. We do not think there is any cause for alarm, yet the present state of the cheese trade is significant. Such words as "the American are absorbing all the demand," Dutch, like English, is being driven out of consumption," have, to say the least, not a very cheerful tone. We cannot question the authority of the very eminent firm of cheese factors from whom we obtain our monthly reports. We have no wish to create a panic among English cheesemongers, but we cannot suppress the information afforded us, and therefore print it *verbatim et literatim*. There is no very immediate danger in the American competition; but it behoves us to be on the alert, and to produce cheese at the least possible expense, and of the very best quality. The success of America is to be attributed to the extensive organization of her cheese factories, whereby division of labor is effected, a large working capital used in the manufacture of cheese, and an uniform good make produced, by converting milk into cheese on a large scale; and by the employment of skilled labor under the superintendence of scientific, enterprising commercial men. The system which has done so much for America can undoubtedly do a great deal for us, and enable us to maintain our ground against all comers. We therefore watch, with a daily increased interest, the success of cheese factories in our own country.

ANIMAL food should not be eaten more than twice a day.

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PROGRESS OF UNDERGROUND ROADWAYS.

Another tunnel, at an expense of $500,000, is to be constructed under the Thames River, at London, from Arthur street, near London Bridge, to St. George's Church, Southwark. The new tunnel is to be made on the same principle as the subway now existing, which extends from Tower Hill, under the Thames, to Southwark. The new tunnel, when complete, will make the third that has been constructed under the Thames. The great double tunnel, of Brunel, now forms part of the London underground railway system.

Several years' experience in London with the various forms of city railways, has conclusively demonstrated that the underground method is by all odds the best for rapid city transit. It affords a safe, quick, and cheap means of communication, unattended by substantial difficulties or objections. The bridge or viaduct plan of placing the track above the streets, is found to be most expensive, besides being cumbersome and obstructive to the public. This plan has been on trial in New York for the past three years, on a single track line, three miles in length, extending from Dey street, at the southern end of the city, northerly, through Greenwich street and Ninth avenue, to 32d street. But it has failed as a financial concern, and is shortly to be taken down and sold for old iron. No greater nuisance was ever inflicted on the town than the erection of this viaduct railway, and everybody will rejoice at its demolition.

Among the special advantages of underground city roadways, it may be observed that they are out of sight, encumber no streets, and their operation is productive of no serious annoyance to the public. Instead of encumbering the streets, every such roadway, in fact adds a new street to the city, and thus increases its area.

The leading engineers, both in Europe and in this country, regard the underground system as far preferable to the bridge system for city purposes, and new underground roadways have been commenced and projected at several points.

In the city of Chicago, two roadways have been already constructed under the Chicago river, and another surveyed. These underground and under-river roads have proved to be of great value to the public, as avenues for communication between the parts of the city separated by the river, over which bridges had been previously used.

At Detroit, a grand railway tunnel is about to be constructed under the Detroit river, to connect the city with the Canadian shore. Illustrations of this tunnel have heretofore been published in the SCIENTIFIC AMERICAN.

At Baltimore, Md., a splendid underground railway is now in process of construction, and is rapidly progressing. This railway will form a connecting link between the Baltimore and Ohio railway and the Philadelphia railway. This tunnel has an exterior diameter of 30 feet; 400 men are at work. It is to be finished in less than two years.

The latest and most approved engineering methods for city communication are thus being adopted in all directions—except in New York city. In this metropolis, the municipal managers are notorious for their crookedness, and they exhibit a singular perversity and blindness in respect to the engineering plans for rapid city transit.

Instead of building tunnels under the river between Brooklyn and New York, which could be constructed in one or two years for one or two millions each, they are now going on with the slow process of erecting a gigantic suspension bridge, requiring ten or twelve years for construction, at a cost of ten or twelve millions of dollars, drawn from the public chest.

In this city proper, where facilities for rapid local travel are imperatively needed, instead of encouraging the building by private enterprise of an underground railway, which could be constructed in a couple of years, for one or two millions per mile, they contemplate the erection of a monstrous elevated or bridge railway, at a cost of some sixty millions of dollars, the money to be drawn, after the manner of the Ring, from the public treasury. The nuisance of the Greenwich street bridge is thus to be again introduced on a larger scale, and on a more central, and therefore more objectionable line.

This new bridge will be some twelve miles long, dividing the city like a wall, greatly interfering with the comfort of citizens resident near its line, and forming an ugly eyesore for everybody. The New York *Tribune* has published engravings from the drawings of this bridge, showing the style of structure to be erected over the street crossings. It represents a heavy aqueduct-like erection in stone, of mediæval architecture, placed like a barrier across Broadway, reminding one of Temple Bar, in London, but more clumsy than the latter. According to the *Tribune*, there are to be some two hundred of these gloomy bridges, or one over each street crossing. Such is the latest style of New York engineering. It is strictly in character with the operations of the men composing the Ring, who rule New York, and who have, by their wretched management and shameless plunderings of the public treasury, nearly brought the city to financial ruin.

THE ACTION OF TRADES UNIONS IN REGARD TO APPRENTICESHIP.

We have never denied that, in the present organization of society, the right, and perhaps even the necessity, exists for those having certain common interests to form associations to protect those interests. We have never questioned the legitimacy of trades unions, as such; though we have denied their right, under any civil code now existing, to dictate to employers any thing except what wages they are willing to work for, and even this right we limit to the making certain wages represent a certain definite amount of work performed, not an indiscriminate *per capita*, regardless of the varying value of individual service.

The payment of wages by the hour, day, or any stipulated time, we regard as an essentially vicious system, and its existence has placed employers in a relation to the employed which has enabled the latter to fix a very false and unequally operating basis of wages.

The question of wages—a source of trouble, from the mutable character of relative values—is the only real question with which the trades unions are grappling. Though professing to aim at the permanent elevation of labor, and the final and permanent adjustment of its relations with capital, their efforts are wholly put forth to compel capital to pay the members of these organizations more than they at present receive, or to oppose the working of the laws of supply and demand, as much as may be, to prevent any decrease from present rates.

By this method of procedure, they lose two very important elements of strength, namely, the earnest sympathy of philanthropists and philosophers who desire the permanent amelioration of the working classes, and the political strength of numbers, which, if unity of action directed by wise counsel were secured, would soon enable the laboring population to work out for themselves such amelioration.

If any thing be sought beyond present increase of pay—or what amounts to the same thing, reduced hours of labor without decrease of wages—never was a blinder, more selfish policy pursued, than the course these organizations adopt in regard to apprentices. Not one leader among them seems to have either the shrewdness or the courage to think or say, "The more of us there are, the stronger is our organization, the sooner can we control legislation, and secure to workingmen and women that share of the world's goods to which their services as producers entitle them." On the other hand, their reasoning is this: "The world needs just so much plastering, shoemaking, horseshoeing, digging, etc. If we prevent the ranks of plasterers, shoemakers, horseshoers, diggers, etc., from filling up or increasing, the present workers in these fields of labor will have the monopoly of the work, and if not able to do it all, why then the law of supply and demand will work in our favor; and whenever it works for us we will let it work, without interference." It is "*we*," "*us*," and "*our*" with these trades unions, not "*mankind*," "*justice*," "*equality*."

In view of this action, how vain is it for the *Internationale* to prate of the abolition of war through the abolition of frontiers, of the general distribution of property, its equal common enjoyment, and all the other grand principles of social reconstruction which have lately been published to the world as the aim and purpose of this organization!

Boys who wish to learn trades now find it almost impossible to do so, such are the difficulties which have been created by the organizations in question. The numbers of artizans in the various trades are daily decreasing. Those who are excluded come to regard the monopolists of labor with even greater abhorrence than the monopolists of capital; and thus, instead of building up the great cause of the emancipation of labor, these societies are bending their efforts to the support of an abnormal system of wages, and the defeat of natural commercial laws, the action of which may be stayed, but never can be held in permanent check. Men may permanently stop the flow of a stream, and dry the channel below their dam; but, however small the stream, the natural and gradual accumulation of the waters will ultimately break through or over the strongest obstacle, and the natural order will be resumed.

So in this matter of apprenticeship, as assumed to be controlled by trades unions. Every apprentice excluded is a recruit rejected—the strength of the unions will remain only about constant, or will reach a point beyond which it cannot increase; while the excluded multiply, and the social forces destined to overthrow the power of these associations accumulate. Unless they adopt a more liberal policy, their fate will be that of the ancient guilds, and a generation or two will witness their decadence, if not their extinction.

Making the permanent elevation of the producing classes their high aim, they would adopt a principle the vitality of which would lend growth and strength to their organizations and would certainly triumph in the end.

THE FEAR OF CHOLERA.

It is said that a merchant, during one of the former visitations of cholera to this country, having become so unduly alarmed as to flee incontinently into the country, closing his place of business during his absence, a wag placed upon the door of the absentee the following notice:

"Not cholera sick, nor cholera dead;
But through the fear of cholera fled,
Will soon return, when cholera's over;
If from his fright he should recover."

The unreasonable and excessive fear of some people is well ridiculed in the lines above quoted, but such foolish terror differs very widely from the proper caution which should mark the action of public authorities upon the approach of this scourge. Such caution will receive the praise of all intelligent men, for although the nature of the disease is still problematical, and although there are yet wide differences as to its treatment when acquired, there is unanimity of opinion as to the causes which tend to aggrevate and increase the disease, the removal of which surely lessens its mortality.

This country has had a scarce defined fear, that the cholera would reach us ere long, and that the ravages it has made in the east would be transferred to our shores. In England the fear of the disease has assumed definite form, and the municipal officers of most of its cities have taken decided action upon the removal of nuisances and the enforcement of cleanliness. In London, the dustmen have been ordered to remove rubbish and refuse twice each week from every house, and daily to clean out every public dust bin, and cart away its contents. Owners or occupiers of houses allowing stagnant water to remain in water closets, etc., are fined ten dollars for each offence, and penalties are imposed upon all who pursue offensive trades after notice to discontinue them. It is also made penal to tolerate common nuisances in houses, or to admit into them live hogs, goats, geese, etc., which has been practiced by some of the lower classes. Butchers who sell stale meat, or dealers in fish or fruit who sell damaged or stale articles, are fined one hundred dollars, and the damaged articles are seized and destroyed.

The commissioners instruct and encourage the people in the free use of disinfectants, and warn them against uncleanly habits. Inspectors are constantly on the lookout for violators of health ordinances, and owners and occupants are exhorted to be more than usually vigilant in the care of their buildings.

This does not look like senseless fright. It is evident the health officers of London apprehend the advent of cholera before long, and are anxious to limit its horrors by every means in their power. The season is too far advanced to admit of much danger from cholera in this country during the present autumn and ensuing winter; but unless its progress shall have been stayed, the next summer will be likely to bring it to our shores. Should this occur, it is to be hoped all our cities, New York city in particular, will be better prepared for its reception than it has been during the recent hot weather, when a walk by either of the two great markets was equal in effect upon sensitive stomachs to a full dose of ipecacuanha, and a trip through some of the tenant house districts was enough to make the stoutest stomach rebel.

FEARFUL EXPLOSION OF TORPEDOES---CORONER'S VERDICT.

The explosion of Union torpedoes and other fireworks, at 126 Beekman street, this city, on the 14th inst., adds one more to the remarkable list of similar destructive accidents for which the present year has been so notorious.

The particulars of the catastrophe are familiar by this time to most of our readers. A wagon standing on one of the most frequented portions of one of the busiest streets in our city, close to Fulton market—which attracts thousands of people daily—was loading with boxes of a firework so dangerous that their use has been prohibited by municipal law. One box dropped, and instantly wagon, driver, and team were not only crushed and mangled, but scarcely a building in the entire block escaped injury. Scarcely could a place have been selected with more certainty that numbers would be killed by such an explosion. The slaughter is all the more harrowing when we remember that it occurred in an occupation that adds nothing to the welfare of mankind. The use of dangerous fireworks is, of all amusements, the most senseless and wasteful.

As one gentleman remarked, "we none of us know when we are safe." Walking along a quiet street, where we should have every reason to suppose we may tread firmly, we are liable perhaps, at any moment, to be thrown, mangled and bleeding, into mid air, or crushed beneath the walls of falling buildings. The reckless way in which human life is disregarded is frightfully appalling.

One of the proprietors of the establishment in Beekman street was awfully maimed, and has since died. Let the other offenders in this horrible affair be caused to feel that public

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opinion may be made almost as terrible as the death swiftly meted out to their partner in guilt.

The testimony before the Coroner shows that these men persistently sold the torpedoes with full knowledge of their dangerous character, and in knowing and wilful violation of law. Serious explosions are said to have occurred with them in various parts of the country—one seriously injuring a carman at No. 252 Washington street, in this city—the torpedoes having been sold by this very firm after they had been notified to desist, and while actions at law were pending for their disregard of the notice.

It was testified also that the dangerous character of these torpedoes is so well known, that very few dealers in fireworks will have anything to do with them. Even the ill-fated driver was cautioned to drive slowly in taking them to the place of shipment, yet, notwithstanding these and other evidences of knowledge on the part of the manufacturers—Klueber & Goldschmidt—they sent these boxes with no warning upon them to let people know their dangerous character—no directions to handle carefully—nothing whatever to prevent an accident that might wreck a train or a boat. If ever there was a plain case of wilful recklessness of possible consequences, their action in this matter was such a case.

According to the patent of Charles Nelson, granted June 1, 1867, and under which it is alleged Klueber and Goldschmidt were manufacturing the Union torpedoes, a hollow ball is filled with a composition of amorphous phosphorus, chlorate of potash, sulphur, and chalk, which s plugged in. The exterior is varnished.

The claim covers such a preparation of these materials as shall be harmless in exploding, and doubtless such a preparation could be made, and perhaps was made at first; but any one who has seen the Union torpedoes explode, and who is acquainted with the materials in question, will doubt whether there was either much sulphur or chalk used in them. They were popular with boys on account of the violence of their report, and to secure this popularity we believe the manufacturers departed from the formula given in the specification of the letters patent, and wantonly increased the quantity of the most dangerous ingredients—chlorate of potash and phosphorus. An examination of their composition by a chemist would determine this, and ought to be made.

Among others, examined before the Coroner's jury, was Charles Nelson of East New York, who testified that he was the patentee of the Union torpedo; he had obtained the patent in 1866; had sold the patent early in 1870 to Klueber & Goldschmidt, retaining a percentage; sold the whole right; the ingredients of which the torpedo is composed are chlorate of potash, phosphorus, and a clay coating; they explode by concussion; does not think them dangerous; [laughter] would not be afraid to have them in a store; receives a royalty of 10 cents on every thousand; in August, received $290 as a half year's royalty; carried on the business of manufacturing them for three years; does not think that a fall of a box on the walk would cause the torpedoes in it to explode; had handled thousands of boxes, and never had an accident; never heard of one before this one; would be willing to have his children play with them; had originally made them in Germany; they are of the same material as the Orsini bombs thrown at the Emperor Napoleon, the only difference being that the Orsini bomb had an iron coating, and these were coated with clay; have no knowledge of chemistry, but know that this combination will cause an explosion; the shock of one box exploding might explode the others; extreme heat might explode them; heat of a stove would be sufficient; the heat of the sun would not be sufficient; did not known until Thursday's accident that the shock of a box falling would explode the torpedoes in it; could not say whether or not a torpedo exploding in the box would explode the others.

The writer once, in showing a class in chemistry the explosive character of a mixture of chlorate of potash and phosphorus—employing only a very small quantity—blew the bottom out of a stout Wedgewood mortar. These materials explode with truly fearful violence, as every chemist knows. When used in match making they are mixed with substances that counteract their violence; but even with these preparations great care is constantly necessary to prevent accidents.

Such are the ingredients which have been sent out, covered only by a thin coating of tawdry colored clay and packed in sawdust, to mutilate and kill peaceable citizens and destroy property.

The surviving partner was arrested, but admitted to bail to await the action of the Grand Jury. We do not know whether bail could have been legally refused, but in common with many others, we believe men who are so indifferent to the rights of others are too dangerous to society to walk outside of prison walls.

From other portions of the country come upon us still, in swift succession, the records of awful explosions of steam boilers, and the wholesale destruction of life thereby. The indignation of the public is culminating, and we shall greatly mistake if the coming winter's legislation does not impose much severer restrictions upon boiler users and dealers, and handlers of explosives, than they have yet been subjected to.

TEST FOR GALVANIZED IRON.—When zinc is deposited on iron by galvanic agency, it should form a chemical combination with the iron, and not be merely attached thereto. It is proposed by Mr. T. Bruce Warren, of England, to use this fact for practically testing the efficiency of the galvanization. If mercury be poured over the surface, the zinc that is only locally attached will form an amalgam with the mercury. Mr. Warren also uses this as a quantitative test, to verify the amount of zinc in combination with the iron.

[Special Correspondence of the Scientific American.]

INTERESTING EXTENSION CASES.

Washington, D. C., September 18, 1871.

The application of E. P. Torry for an extension of the patent granted to him and W. B. Tilton, for improvement in door springs, has been refused, and the case presents some novel features. The invention is a device for increasing or decreasing the power of the spring, in what is well known as the "tortive rod door spring," and consists in a combination of a protruding end of the rod, squared to fit a key, with a ratchet wheel firmly attached to the rod, and a pawl so attached to a bracket as to act as a stop to the ratchet wheel. The evidence presented by the remonstrant goes far to show that a mechanical equivalent of the device existed at the time the patent was applied for, and that therefore it should not have been issued. The extension, however, was refused on other grounds, which were these: The law provides that an extension can be granted on the application of the patentee only, which, by the construction of the courts, includes his executors or administrators. In the present case, Torry alone appears as applicant. He claims to act for both himself and Tilton, but at the same time acknowledges that he is ignorant of the whereabouts of Tilton, and even supposes him to be dead. Torry also claims that by an assignment he holds all Tilton's interest in the patent, including an extension, if granted, but the office records do not show such an assignment.

The patent to Thomas J. Chubb, of New York, has been extended, though strongly contested by Mr. A. R. Wetmore, in behalf of an ore dressing company.

The invention consists in placing the finely pulverized ore on a screen or perforated plate, in a thin stratum, and agitating the stratum by forcing up light puffs of air through it. Movable scrapers pass over the top of the layer to remove the lighter portions blown up by the air puffs, while the heavier portions pass to another receptacle. The opposition claimed that the patent should not have been issued, in view of the patent to E. L. Seymour, dated September 19, 1854. In answer to this, an agreement between Seymour and Chubb, dated in 1853, was produced, in which the former acknowledges the latter to be the inventor of the process. The case at this point became more complicated by the averment of the opposition that the paper referred to was a forgery. The office did not consider the charge sustained. A second point taken by the opposing party was that the invention is worthless for the purpose intended, the argument being briefly this: That a machine or process for separating ores without the aid of water is a great desideratum in the market, that Chubb's machine has not been brought into general use, therefore it is unpractical and a failure.

The following patents have also been extended this month: To George E. Burt, Abram Wright, and George F. Wright, for an improvement in horse powers, which consists in giving such a shape, to the ends of the side tracks, that closely fitted platform chains, of any desired width of sections, can be fitted tightly to the track, and yet pass over their extremities with a perfect and unvarying smoothness. The ends of the tracks are shaped in accordance with an exact geometric method. The invention has proved useful in lessening the wear of the machinery and in affording relief to the horse.

Also, the patent to Isaac A. Durham for improvement in edge planes for trimming boot and shoe soles, being a substitute for the naked knife, which is liable to cut the upper even when used with the greatest care; whereas this device is so constructed that there is no possibility of damaging the upper. Nothing of the kind was known at the time the patent was granted, and it has become so indispensable an implement as to quite revolutionize this branch of the trade.

Also, the patent to Chauncey Thomas for a carriage top prop, which consists of a stud arranged on the bows to form a bearing for the jointed bars or braces, by which the top is lowered and raised. A screw cup encloses the prop, forming an ornamental finish, also confining the leather to the bow and serving as a shoulder for one of the joint bars to rest upon.

Also the patent to Timothy Alden (deceased) for a type setting and distributing machine. This is a strong case, as illustrating the wisdom of the law authorizing extensions. The machine is necessarily very complex, and demands special skill and nicety of workmanship, in the construction and adjustment of its various parts. The inventor unfortunately died soon after the patent was issued, and when engaged in devising improvements in his machine. To secure the general or even partial adoption of such a mechanism, necessarily expensive, it must be brought to a high state of completeness, otherwise the chances of imperfection in its operation will overbalance the advantages. Hence it appears that the parties interested have been occupied, during the whole term of the patent, in making the needed modifications and improvements at great expense. It is stated that the inventor expended over $41,000 without remuneration, and the company controlling the patent has expended about $300,000.

One of the earlier machines, though somewhat improved on the original, was tested in the offices of the New York *Herald* and *Tribune;* and in 1868, the Appletons used one in setting up the type of a small volume and of several pamphlets. These and other experiments were sufficiently successful to afford ample encouragement that the machine would eventually be substituted for hand labor. It was found that by its use one compositor could accomplish the work of six compositors setting by hand. For example, 3,800 ems were set up and distributed in an hour, 500 to 600 ems being a full average by the ordinary mode. There can be no question that such a machine well merits the additional protection of seven years. It may not be known to all your readers that, under the present patent laws, no patent granted since March 2, 1861, can be extended.

The recent decision of the Commissioner in the case of David Eynon, applicant for letters patent for an improvement in machinery for making spikes, is exciting much interest and discussion, as bringing up, in a somewhat novel form, the much debated question as to what a "patentable combination" of devices may properly include. The facts are briefly these: The invention claimed consists in a combination or arrangement of the reducing rolls of a rolling mill, a spike making machine, and an intermediate furnace of peculiar construction, by means of which a bar of iron is so manipulated as to retain the heat it has when leaving the rolls until made into spikes, the object being to save time and material, and to produce a better article, it being a well known fact that iron deteriorates by cooling and reheating. The bar of iron is taken directly from the reducing rolls to the spike machine, and the rear end is swung over the furnace, so as to retain its proper temperature, while the other end is worked into spikes, thereby saving the time and waste of cutting into lengths, as well as the time and injurious effect of reheating. The above arrangement of the furnace, the rolls, and the spike machine is claimed, also the combination of the furnace with its movable roof. To the first claim the Examiner takes exception, as being a *nonpatentable combination*, for the reasons that the distance of the reducing rolls from the spike machine is not stated, that no mechanism is shown for conducting the bar of iron to the spike machine or to the furnace, and that the devices of the combination do not *co act* in producing the result. He contends that the claim is for a combination of three different mechanisms, separate from one another by indefinite distances, each designed for and subserving a different purpose, in no way dependent upon one another, or upon intermediate mechanism, and executing severally all the functions of which they are capable just as fully and perfectly if separated by miles of distance as if separated by a few feet only; and that the specification is silent in regard to the location of the rolls, which may be in the same mill, or in another mill, or another town.

Under rule 44, the case at this point on the examination was taken by appeal to the Commissioner, who, in the decision referred to, discusses the question at issue with great clearness and conciseness, and pronounces the claim allowable, though he advises the substitution of the word "combination" for the word "arrangement." Without attempting to give in detail the Commissioner's argument, the leading positions taken may be of interest, and were these, namely, that the test of invention is the result, a new result implying new machinery or a new combination of old machinery; if the effect of the combination is claimed as new, or as better, or as more economically produced, it is patentable, provided all the devices take part in producing the result; that in the case under consideration, the three machines, namely, the reducing rolls, the furnace, and the spike machine, constitute *one machine*, under the authorized definition of a machine, which includes every mechanical device or combination of mechanical powers or devices to perform some function and produce a certain effect or result; that the three machines co-act to produce a useful result, namely, a better and cheaper article; that the specified arrangement of these machines is the cause of and essential to the result, and each machine acts an important part; that it is not necessary that the parts co-operate at the same time, nor that they be connected by operating mechanisms, as the effect is complete without such connections.

The case was returned to the examiner for examination on its novelty; and has passed to issue. ‡

FAIR OF THE AMERICAN INSTITUTE.

This exhibition may now be said to be fairly under way, although there are still tardy exhibitors who have not yet filled their places.

In our last visit to the capacious building in which the fair is held, we passed through the sections containing agricultural machinery and implements, that containing the wood working machinery, and so far through the steam engineering department as to notice the boilers and engines. The

BOILERS

on exhibition comprise the well known Root's Iron Sectional Safety Boiler, exhibited by the Root Steam Engine Company, 500 Second avenue, New York; Phleger's Patent Steam Generator, manufactured by John B. Lady, 3,029 Chestnut street, Philadelphia, Pa.; a tubular boiler, the name of which, and the address of the exhibitor, we failed to obtain, but will endeavor to mention in a future article; and the Allen Boiler, illustrated and described on page 134, last volume of the SCIENTIFIC AMERICAN.

The Phleger Boiler has some features of novelty in construction, but the old principle of heating water in tubes heated externally is the chief feature of its construction, the tubes being so arranged in connection with a capacious steam dome, as to secure, it is said, very good circulation, economical consumption of fuel, and, according to the statements of the engineer in charge of the large engine which drives the principal part of the machinery, quite dry steam.

The Allen Boiler, exhibited by the Allen Engine Works, Fourth avenue and 130th street, New York, was not fired up, but will be used to supply steam to part of the machinery on exhibition.

THE ENGINES

shown are few in number, and possess few features of novelty. Of these, the principal one is an eighty horse power engine, of beautiful and substantial design, shown by William Wright & Co., of Newburgh, N. Y. It has an admirable va-

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riable cut-off, controlled by the governor. Cams, revolving on a horizontal shaft, lift toes attached to the valve stems, the cams being so arranged that when the shaft is moved longitudinally, the toes are let off, earlier or later in the stroke, according to the necessities of the work performed. The cams are so constructed that, when the toes are let off, there is no reaction whatever upon the governor. The governor has the novel feature that the bolts are suspended in radial arms above, instead of below, the pivot of the arms, so that gravity aids instead of acting against centrifugal force. This arrangement admits of their being enclosed in a graceful urn, which gives a very ornamental appearance to the engine. The whole is a splendid piece of work, and attracts much attention from the mechanics and engineers who visit the fair.

Handren & Ripley, Albany Street Iron Works, 16 and 18 Albany street, New York, show several vertical, and one small horizontal Rider Cut-off steam engine. These engines have won an excellent reputation, and are worthy the notice of all who visit the fair. They were illustrated and described on pages 363, volume XXII., and 66, volume XXIII., of the SCIENTIFIC AMERICAN, to which the reader is referred for further particulars in regard to them.

Close by the Wright Steam Engine stands the Starkey Engine, which for simplicity, compactness, and cheapness is perhaps as remarkable as any shown. It is exhibited by the Columbian Iron Works, Wm. Taylor and Sons, Brooklyn, N. Y. It has no eccentric; the valve, which is a balanced oscillating valve, is worked by a connecting rod pivoted to the pitman of the engine, so that the motion of the pitman, as it departs from the perpendicular in turning the crank, is directly utilized to actuate the valve. The valve may be made to cut off, at any desired part of the stroke, by a very simple adjustment; and, as an example of how few parts may compose an effective steam engine, it is worthy of special notice.

Wood and Mann, Utica Steam Engine Company, Utica, N. Y., and 42 Courtlandt street, New York, show their portable and stationary steam engines this year, and make a fine exhibit.

The Baxter Steam Engine Company, 18 Park Place, New York, exhibit three different sizes of their engines, the features of which have been somewhat changed since its illustration and description on page 353, volume XX., of the SCIENTIFIC AMERICAN. We have not space to notice these alterations in this place, but they give a more compact and ornamental appearance to the engine, which has gained a wide popularity during the two years it has been before the public.

The new Rider Caloric Engine, exhibited by the Delamater Iron Works, foot of West Thirteenth street, New York, attracts much attention, and is evidently a formidable competitor to the hot air engines now in market.

Another novelty is a small aero-steam engine, exhibited by Professor Rogers and Mr. Black, of the University of Pennsylvania. They employ a steam aspirator, acting on a similar principle to that of the well known injector, by which air is carried into the cylinder along with the steam, an increase of thirty-three per cent in power being claimed. The admission of air produces a striking increase in velocity, without any apparent change in the volume of steam admitted. This little affair is exciting considerable attention. Upon it is placed the Lynde's Safety Steam Engine Governor, illustrated and described in our issue of September 9th, present volume.

In the department of

AGRICULTURAL MACHINERY

there is very little that is new this year. There is the usual collection of churns, portable cider mills, etc., etc. Of the larger machines there is also the usual collection. The following mowers and reapers are shown:

Wilber's Eureka Mower is placed on view by the Wilber's Eureka Mower and Reaper Co. The well known Buckeye Mower and Self Raking Reaper is shown by Adriance Platt & Co. The Walter A. Woods Jointed Bar Mower and Self Rake Reaper is exhibited by the Walter A. Wood Mowing and Reaping Machine Co. The reputation of these machines is too well established to need a word from us. The Sprague Mowing Machine Co. show one of their machines. This machine made its first appearance last year, and attracted general attention from its lightness, its boxed-in gearing, and other improved features. In the Columbian Mowing and Reaping Machine, exhibited by the American Agricultural Works, we notice some important improvements, one of which is a rake controllable at the will of the operator. The tongue is also adjusted so as not to bear upon the necks of the horses, the frame being perfectly balanced, and oscillating on the axle or main shaft. The guards are placed three and one half inches apart, and the cutter bar makes a four inch stroke, allowing the knives to pass sufficiently through the guards to prevent clogging. The reaping attachment can be detached, and the machine converted into a mower, in scarcely a minute of time. The knives make forty-eight vibrations to every revolution of the drive wheel, which is thirty-five inches in diameter, and have two and one half inches on the cut, thus preventing the possibility of choking in heavy bottom grass. This firm also exhibits a Smalley's Corn Plow and Cultivator combined, which covers two rows at once, can be adapted to any width of row, has reversible plows, which can be used for hilling up, and possesses other important features which we forbear to enumerate. It is evidently a first class implement.

The Advance Mower is also exhibited by the Belvidere Manufacturing Co., of N. J., but displays this year no new features of construction, so far as we were able to observe. Various sizes of the Excelsior Lawn Mower are shown by Robert C. Reeves, 185 and 187 Water Street, New York.

WOOD WORKING MACHINERY.

This department always forms an interesting feature of these fairs. We observe several novelties this year, among which is A. S. Gear's (56 Sudbury street, Boston, Mass.) Molding, Paneling, Dovetailing, Carving, and Boring Machine, which does a variety of work truly astonishing and in a manner scarcely to be excelled. No one who visits the fair should fail to see this machine.

S. W. Bidwell's Patent Blind Boring Machine, manufactured by the Colt's Patent Fire Arms Co., Hartford, Conn., makes its first appearance at these fairs this year. The machine bores the stiles and lays out its own work at the same time. It will bore outside and inside blinds. The gang of bits, twenty or more in number, is, by a very ingenious arrangement, adjusted so as to set the bits to any desired distance apart. It is claimed that it will bore and lay out the work upon seventy-five pairs of blinds per hour.

Mr. H. H. Evarts, of 93 Liberty street, New York, exhibits his Dovetailing Machine, described and illustrated in our issue of Feb. 11, 1871. Various styles and forms are made for dovetailing round corners, etc., etc. The machine proves its merits in actual operation, and is justifying the favorable opinion of it we expressed in the article alluded to.

Another novelty is S. C. Ellis' Marking or Laying Out machine, for laying out sashes, blinds, doors, etc. Wheels, carrying small spurs for marking, revolve upon a shaft. The stile or piece to be marked is laid upon a movable table and pressed up against the wheels; the latter being made adjustable lengthwise on the shaft to the proper distances. Great uniformity is thus secured, the pieces being laid out as nearly alike as is possible by any mechanical means. Mr. Seth G. Ellis, of Jersey City, is the exhibitor of this machine. He also shows a journal box of novel construction, made so that it can be set to prevent any lift of a mandrel. The cap of the box is made in two pieces, which are slotted and held by set screws, and so otherwise constructed that they may take up all wear, and hold the mandrel down to a perfect fit. Practical common sense is shown in every detail of this invention.

A new dovetailing machine comes all the way from California. The exhibitor is S. W. Shaw, No. 9 Pine street, New York. The pieces worked upon are not clamped, but simply held by the hand of the operator, and are guided by gages that pass over the cutters. The cutters project from a cylinder attached to a mandrel for forming the tenons. At the other end, a cone takes the place of a cylinder for forming the mortises. It is claimed that the machine, with a competent workman, will do the work of twenty men.

The exhibition of scroll saws is not so full as it was last year. We note nothing new except one shown by Henry L. Beach, 90 Fulton street, New York, who exhibits a Spiral Spring Scroll Sawing Machine, running at the high speed of from 1,000 to 1,200 revolutions per minute without jar. No support is required back of the saw, and the entire table is clear for work. The same exhibitor shows his Positive Motion Scroll Saw, illustrated and described on page 63, volume XIII. of the SCIENTIFIC AMERICAN.

There are also present band sawing machines exhibited by First and Pryibill, and by J. T. and R. H. Plasse, of New York, but these machines present no new features.

The Eureka Wood Working Combination Machine, shown by J. A. Wood, Far Rockaway, L. I., is worked by hand power, and is a useful machine for small shops.

There is, however, perhaps no machine in this department more deserving of mention than Haven's Compound Circular Sawing and Variable Grooving Machine, which cuts bevels in any direction, and does a variety of work in a superior manner.

SPRING OF INFLAMMABLE GAS IN KENTUCKY.—In Lincoln county, near the Cumberland mountains, Ky., there is a spring of water, kept in a constant state of agitation by the ascent of carburetted hydrogen. The well overflows once a day, and the gas is highly inflammable. No satisfactory explanation of the overflow of the water, which occurs about two hours after the *maximum* heat of the day, has yet been given.

Inventions Patented in England by Americans.

August 29 to September 4, 1871, inclusive.

[Compiled from the Commissioners of Patents' Journal].

BILLIARD MAKER.—W. H. Newell, Hudson City, N. J.
BOLT, ETC.—G. C. Bell (of Buffalo, N. Y.), 8 Southampton Buildings, London, England.
COLORING MARBLE, ETC.—J. Zengler (of Chicago, Ill.), 8 Southampton Buildings, London, England.
ELECTRIC TELEGRAPH, ETC.—G. Little, Rutherfurd Park, N. J.
FIRE ARMS, ETC.—I. M. Millbank, Greenfield Hill, Conn.
GRINDING QUARTZ, ETC.—G. Mitchell, Philadelphia, Pa.
HARNESS, ETC.—D. Curtis (of Sun Prairie, Wis.), 34 Southampton Buildings, London, England.
MATCH, ETC.—McC. Young, Frederick, Md.
PREPARING HIDES, ETC.—L. F. Robertson, New York city.
PRINTING MACHINE.—A. A. Dunk, Philadelphia, Pa.
SAW.—G. B. Green, Philadelphia, Pa.
SIGNAL APPARATUS, ETC.—W. Robinson, Brooklyn, N. Y.
SPINNING MACHINE.—J. G. Avery, New York city.
STANNATE OF SODA AND OF POTASH.—C. Lennig, Philadelphia, Pa.
VEHICLE FOR PAINT, ETC.—P. Smart, Boston, Mass.

Foreign Patents.

The population of Great Britain is 31,000,000; of France, 37,000,000 Belgium, 5,000,000; Austria, 36,000,000; Prussia, 40,000,000; and Russia, 70,000,000. Patents may be secured by American citizens in all of these countries. Now is the time, while business is dull at home, to take advantage of these immense foreign fields. Mechanical improvements of all kinds are always in demand in Europe. There will never be a better time than the present to take patents abroad. We have reliable business connections with the principal capitals of Europe. A large share of all the patents secured in foreign countries by Americans are obtained through our Agency. Address MUNN & Co., 37 Park Row, New York. Circulars, with full information on foreign patents, furnished fre

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Repertory of Arts.—For sale, a complete set of the Repertory of Arts, handsomely bound, half calf, uniform size, with general indices comprising five series and 113 volumes. Perfect in every respect. Embracing Inventions, Discoveries, and Improvements in Arts, Manufactures and Agriculture, with Engravings—from 1795 down to 1856. Apply to MUNN & Co., office of the SCIENTIFIC AMERICAN.

Send 25 cents to C. F. & W. H. Chandler, School of Mines Columbia College, East 49th street, New York, for a specimen number o the *American Chemist.*

Patent Felt Floor Carpeting. C. J. Fay, Camden, N. J.

Wanted—Asbestos, long fibre, soft and pliable. Address, enclosing sample, Thomas S. Dixon & Sons, 1324 Chestnut St., Philadelphia.

Parties desiring to introduce and sell machinery of any kind, and of agricultural or other useful implements in Texas, will meet representatives of a firm at Galveston largely interested in that line, by addressing J., 49 Clinton Place, New York.

All kinds of Presses and Dies. Bliss & Williams, successors to Mays & Bliss, 118 to 122 Plymouth St., Brooklyn. Send for Catalogue.

The best lubricating oil in the world is Winter pressed Sperm. Sold in bottles, cans, and barrels, by Wm. F. Nye, New Bedford, Mass.

Gear Wheel Moulding Machines—Paget's Blocks and Gipsy Winches (English Patent). Hamilton E. Towle, 176 Broadway, New York.

Lyman's Gear Chart, with full directions for Laying out Teeth. Price fifty cents. Address Edward Lyman, C.E., New Haven, Ct.

Improved Mode of Graining Wood, pat. July 5, '70, by J. J. Callow, of Cleveland, O., enabling inexperienced grainers ("without the long required study and practice of heretofore") to produce the most beautiful and Natural Graining with unequalled speed and facility. Send stamp for circular.

The paper that meets the eye of manufacturers throughout the United States—Boston Bulletin, $4 00 a year. Advertisements 17c. a line.

Wanted—A man who thoroughly understands making malleable iron, and can superintend a foundry. Address M. I. F., Worcester, Mass.

Upright Drills—The best in the world are built by the Hawes Machine Co., Fall River, Mass. Send for circular.

To Machinists—Wanted a man of experience and ability, to take the Superintendence of a large Machine Shop. Address Q., P. O. Box 2180, New York.

A Valuable Patent and Business given away—Shop and Tools to rent—fine location for Manufacturing Agricultural Implements. Address C. B. Morse, Rhinebeck, N. Y.

Consolidation—"American Manufacturer and Trade of the West." Pittsburgh. Finest and best paper of its class in the world. Everybody takes it.

Presses, Dies, and all Can Tools—Ferracute Works, Bridgeton, N. J.

Refined Paraffine Wax, any kind and quantity. C. C. Beggs & Co., Pittsburgh, Pa.

The Eccentric Elliptic Geared Power Presses save power, time, labor, and save Punches and Dies. For Circulars, address Ivens & Brooke Trenton, N. J.

Vinegar—how made—of Cider, Wine, or Sorgo, in 10 hours. F. Sage, Cromwell, Conn.

See advertisement of Wilkinson's Combination Pocket Tool.

Send to E. & A. Betts, Wilmington, Del., for list of nice Machinists' Tools, on hand, and making.

For best Lubricating Oil, Chard & Howe, 134 Maiden Lane, N. Y

To Cotton Pressers, Storage Men, and Freighters.—35-horse Engine and Boiler, with two Hydraulic Cotton Presses, each capable of pressing 35 bales an hour. Machinery first class. Price extremely low Wm. D. Andrews & Bro., 414 Water st. New York.

L. & J. W. Feuchtwanger, Chemists, 55 Cedar st., New York, manufacturers of Silicates of Soda and Potash, and Soluble Glass.

Send your address to Howard & Co., No. 865 Broadway, New York, and by return mail you will receive their Descriptive Price List of Waltham Watches. All prices reduced since February 1st.

Self-testing Steam Gauge.—The accuracy of this gauge can be tested without removing it from its connection with the boiler. Send circular. E. H. Ashcroft, Boston, Mass.

Ashcroft's Low Water Detector. Thousands in use. Price, $15. Can be applied for less than $1. Send for Circular. E. H. Ashcroft, Boston, Mass.

Brown's Coalyard Quarry & Contractors' Apparatus for hoisting and conveying material by iron cable. W. D. Andrews & Bro, 414 Water st., N. Y

Presses, Dies, and Tinners' Tools. Conor & Mays, late Mays & Bliss, 4 to 8 Water st., opposite Fulton Ferry, Brooklyn, N. Y.

Over 1,000 Tanners, Paper-makers, Contractors, &c., use the Pumps of Heald, Sisco & Co. See advertisement.

For Solid Wrought-iron Beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

Mining, Wrecking, Pumping, Drainage, or Irrigating Machinery, for sale or rent. See advertisement, Andrew's Patent, inside page.

Superior Belting—The best Philadelphia Oak Tanned Leather Belting is manufactured by C. W. Arny, 301 Cherry Street, Philadelphia.

Improved Foot Lathes, Hand Planers, etc. Many a reader of this paper has one of them. Selling in all parts of the country, Canada, Europe, etc. Catalogue free. N. H. Baldwin, Laconia, N. H.

Bailey's Star Hydrant, best and cheapest in the world. All plumbers send for a circular to G. C. Bailey & Co., Pittsburgh, Pa.

Wanted—To invest $500 to $5,000 in a good paying Manufacturing or Mercantile Business. Address Box 574, Pittsburgh, Pa.

Patent for sale, or Partner wanted with capital to introduce the same. Please address Philip Marquard, 468 Swan st., Buffalo, N. Y.

To Ascertain where there will be a demand for new machinery or manufacturers' supplies read Boston Commercial Bulletin's Manufacturing News of the United States. Terms $4 00 a year.

Peck's Patent Drop Press. Milo Peck & Co., New Haven, Ct

Millstone Dressing Diamond Machine—Simple, effective, durable. For description of the above see Scientific American, Nov. 27th 1869. Also, Glazier's Diamonds. John Dickinson, 64 Nassau st., N. Y.

Power Punching and Shearing Machines.
For car builders, smith shops, rail mills, boiler makers, etc. Greenlea Machine Works, Indianapolis, Ind.

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Examples for the Ladies.

Mrs. J. Van Bergen, of Rochester, N. Y., purchased her Wheeler & Wilson Machine in 1853. In the first 14 months she made 1305 vests and pairs of pantaloons, from the coarsest to the finest material, besides doing her family sewing. She has not broken a needle for the last seven years.

Burnett's Kalliston, for bites of Mosquitoes and other insects, neutralizes the poison.

Answers to Correspondents.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at 1·00 a line, under the head of "Business and Personal."

ALL reference to back numbers must be by volume and page.

G. W. N., of Ga.—We do not believe the use of galvanized iron pipes, for domestic water service, advisable. Many kinds of water attack the zinc with great activity. To combine ungalvanized iron with that which is galvanized is a still greater mistake, as chemical action would be increased by the contact of water with the two metals. We judge it is zinc instead of iron that gives the taste to your water, and advise you to substitute a plain iron pipe for the galvanized one. The increase of carbonic acid gas in water, would be likely to increase the hardness of the latter, as water holds lime, magnesia, etc., in solution, by virtue of the carbonic acid it contains. The well is not properly ventilated, as is evident from your statement that carbonic acid accumulates in it since its mouth has been closed.

J. B., of Pa.—We are not aware that any success attended the attempt to cultivate what was called "vegetable silk" in Florida, in 1845. Our present impression is that it was a failure. Perhaps some correspondent will give the information.

CLAY FOR BRICKS.—Some time ago I found in your valuable journal an answer to an inquirer who asked if clay containing chalk could be used for making bricks, and who, I believe, sent a sample of the same to you. As far as I can remember, the answer given to him was, that pieces or particles of chalk in bricks would be slaked by getting wet, and cause the bricks to fall to pieces. From a journal on chemistry, published in Germany, called *Chemisches Central Blatt*, No. 32, Aug. 9, 1871, which I received today, I send you the following: "Hirschberg, of Sondershausen, recommends borax for counteracting lime in clay for brick manufacture. The clay containing lime is deficient, in that it attracts water after burning, whereby the lime is slaked and the consistency of the brick destroyed. The editor has proved by experiment that fresh burnt lime saturated with a cold solution of borax, retains its hardness, unchanged and without crumbling. Clay, containing lime, and mixed with such a solution of borax to a plastic consistency, did, after burning, produce brick which withstood all atmospheric influences.' —A. K., of Pa.

WATER PIPES.—E. J. H.—It is possible to line a short length of iron pipe with porcelain cement, similar to that used in preserving kettles, and we have known this process applied to india rubber speaking tubes, but such experiments have either been too costly, or have died out for want of patronage, and there is no such article as an enamelled or porcelain water pipe to be procured at the present time. E. J. H. can, however, obtain a perfectly safe pipe at one fourth the price of block tin pipe, that will conduct water, without imparting any mineral contamination, namely, tin lined lead pipe, certified by eminent physicians, scientists, and experts, to be the best and safest pipe in the world for the conveyance of water for domestic use. Sold by the Colwells, Shaw, & Willard Manufacturing Co., 213 Center St., New York.—F. D.

TABLE CUTLERY.—I would inform J. E. E., of N. J., that his reply to R. S. S. H., is incorrect. It would be a very hot roast or steak that would reach 530° Fahr., yet this is the degree of heat that table cutlery has to reach, to give it its proper temper. (Nystrom's "Mechanics," page 183). Heating a thousand times over will not lower the temper, unless heated to a greater degree. The reason hot water does not lower the temper of J. E. E.'s razor, is that boiling water is only 212° Fah. His razor was heated to 450° to give it its proper temper.—A. K. S., of Ohio.

GAS FOR BALLOONS.—To T. J. W.—It will take 12 cubic feet of hydrogen gas, used for inflating balloons with, to balance or suspend 1 pound in the air. The rule used for balloons is: Assuming the gravity of the air to be 1, the specific of the gas compared with the air is ·06; so one cubic foot of air weighs 527·04 (troy) grains; the cubic foot of gas weighs 31·62 grains; and so 527·04 − 31·62 = 495·42 grains difference between the air and gas, in one cubic foot. Multiply this difference by the number of cubic feet in the balloon, and divide by 7,000. This will give the capacity or buoyancy of the balloon, in pounds; then subtract the weight of balloon and car.—J. A. Mc., of ——.

HORSE POWER OF ENGINE.—W. A. B.—There are more rules than one for estimating the horse power of an engine. I will give the following, which is about as safe as any. First, find the number of square inches in the end of cylinder, by squaring the diameter and multiplying by the decimal ·7854. Thus: cylinder 16 x 16 x ·7854 = 201·06 square inches in cylinder. Multiply the square inches in cylinder by the number of feet traveled in each revolution, which is 4 feet,—this by the number of revolutions per minute of the engine, 100, and that by 90, the pounds pressure per square inch; divide by 33,000 pounds (which is called a horse power, raised one foot high in a minute of time), then deduct from the whole one-seventh, and you will approximate your effective power. Example: Square inches in cylinder head:

$$\frac{291{\cdot}106 \times 4 \times 100 \times 90}{33{,}000} = 219\tfrac{1}{3} \text{ less } \tfrac{1}{7} \text{ for friction} = 188 \text{ H. P.}$$

J. A. Mc., of ——.

GALVANIZING WIRE SPRINGS.—In your impression of Aug. 19th, O. A. B. wishes to know how to coat wire springs with spelter, without heating them. He can do this by procuring some of Webster's Patent Zinc Metal Paint, which he can apply with the ordinary paint brush, and by so doing, as veritably galvanized his springs (whether iron or steel) as though they had been in the "pickling pot" used by galvanizers, as this paint is made from the spelter itself, reduced into a paint by a patent mechanical process. I have seen springs, iron and zinc, coated with it, to which it adheres most firmly, and what is very astonishing, it sticks to the zinc as firmly as to iron.—J. B. D., of Birmingham, Eng.

RENOVATING CARPETS.—In reply to O. J. M., Vol. XXV., page 170, I beg to state that the best kind of machinery for renovating carpets is four broom corn brushes, 15 feet long, 30 inches diameter, running at a speed of 150 turns per minute—two brushes above and two below the carpet. There is no need of any beaters, as the brushes will take out every particle of dust, and leave the carpets as clean as when they left the store; and, moreover, they will bring up a fine new nap, and freshen the colors. The brushes have three clamps or wings for holding the corn.—J. W. H., of Del.

FLOATING OF SOLID IRON ON MOLTEN IRON.—In answer to S. H. W.'s query concerning the suspension of cold iron in molten metal, the following explanation seems reasonable, and is accepted by many founderymen and others. According to the dynamical theory of heat, the molecules or particles of heated metals are in a state of great agitation, and the higher the temperature, the intenser the molecular motion. The difference in the specific gravity of melted and solid cast iron being slight (as 31 to 32 nearly), this constant and fierce movement of the particles of the former prevents a block of the latter from sinking. An analogous action is found in swift running streams or eddies, upon which bodies of considerably greater gravity than water are supported for a long time' and also in the partial suspension of an egg in boiling water.—F. H. C., of N. Y.

DIMENSIONS OF RIGHT ANGLED TRIANGLE.—To C. E. C.—To find the length of the base, perpendicular, or hypothenuse of a right angled triangle, when one side and angles are given. Rule: As the sine of the angle opposite the given side is to the sine of the angle opposite the required side, then so is the given side to the required side.—J. A. Mc. of ——.

CISTERN.—In regard to H. W. W.'s trouble with his cistern, I would say that he may remedy it by conducting the inlet water to the bottom of the cistern. By this means the contents are agitated at every rainfall, and if well ventilated from above, the water will be kept odorless. I have seen this tried in a cistern 12 x 12 x 6 feet, and the water is perfectly sweet, although it has not been cleaned for five years. Cleaning a cistern is useless for removing the odor. The cause is the motionless "dead" condition of the water, and agitation and good ventilation only are needed, unless it is known to contain some decaying substance. Put the inlet pipe in one corner, and attach a short elbow toward the center of the cistern.—F. H. C., of N. Y.

WEEDS IN GRAVEL WALKS.—Let F. C. try a dilute sulphuric acid, say one part acid to from fifty to one hundred water, in order to kill vegetation from his gravel walks. Sulphuric acid, diluted one thousand times, is a very efficient fertilizer, but in a more concentrated form is very destructive to vegetable life.—A. C. B., of N. C.

STEP FOR WATER WHEEL.—S. H. R.—Take a white oak butt, seasoned under water, dry, and turn the same convex to fit a concave spindle. If a good fit, this will be found to work complete.—J. E. S.

CIRCULAR SAW MILLS.—We notice, in your issue of February 11, 1871, an answer by A. O. B., of Vt., to E. O. T.'s inquiry, that it is folly to run a large saw direct from the engine, from the great liability to spoil the saw. We have built sawmills, with from 52 inch to 66 inch saws, on the direct action principle (which we have patented in Canada), for over seventeen years; have from three to four hundred in use, and never knew a mill that gave such general satisfaction.—C. H. W. & Co., of Ont.

STEPS FOR WATER WHEELS.—Taking for granted that the water wheel turns on a steel spindle—say about 5 or 6 inches below the shaft that the wheel is hung on—the best step is made of a red, live hemlock knot, the spindle resting on the end of the grain of it. Chuck it in a lathe, and make a recess to fit the spindle, say 2½ inches deep.—R. S. B., of N. Y.

APPLYING SAND TO IRON.—Let M. N. S. (query No. 11, Sep. 9) take one pound of good common glue, two ounces of gum ammoniac, liquefied as usual, then add two ounces of nitric acid.—R. S. B., of N. Y.

COLORING STRAW.—Straw is colored much the same way as silk, only it requires stronger tinctures. Royal purple is dyed thus: Tie the straw loosely in bundles, place them in coarse bags, and weight them down in strong liquor, drawn from logwood chips. Boil two hours, take out, rinse in cold water—without taking the straw from the bags; then sink them over night in a vat or tub of dilute muriatic acid, strength, if memory serves me, of 2 degrees Twaddle's scale. Pass through a strong soap lather, rinse, and dry in the shade.—R. S. B., of N. Y.

FALLING BODIES.—In answer to J. E., of September 2, let me say that if M = momemtum or working force, G = 32 1-6 feet, S = space fallen through, V = velocity, Q = quantity of matter, and T = the time used; then,

$$T = \sqrt{QS \div G}\,;\ V = GT\,;\ M = QV.$$

This is only true for a vacuum. But with dense weights, the air offers but little comparative resistance.—T. E. N. E., of Mass.

CHAIN PUMP.—M. H., of Ky.—Is the water in a cistern benefited any by being stirred by the use of a chain pump, used by a great many in preference to the atmospheric pump only on account of the motion imparted to the water when it is used? I myself have used water drawn from a cistern covered with an iron cover, and having no opening whatever, as I filled it from the hydrant through the main hole with hose, and when full, put back the iron cover and did not open it again for about two months. The water was drawn through about 40 feet of lead suction pipe by an iron pump, and pronounced by all who used it as good water as they ever drank. I have met with a great many cases where the water was drawn from cisterns by an atmospheric pump, and had been for years without injuring the water in the least, but I have also met with cases apparently similarly situated, where the water drawn through the pump would taste, and the water from the same cistern, drawn with a bucket, would be entirely free from it, the suction pipes in both cases drawing water about 6 inches from bottom. Could there be anything in the leather that is used for the lower valve and the plunger, that would mix with the water as it passes through the pump?—M. H., of Ky. . . . . We answer M. H. that there is no doubt that in many cases the water of cisterns is kept from stagnation by the action of chain pumps. Water differs greatly in different locations in its power of remaining sweet, owing to the differences in kind and quantity of impurities (chiefly organic) it contains. The leather valves have no such effect as is hinted at in the query.

Queries.

[We present herewith a series of inquiries embracing a variety of topics of greater or less general interest. The questions are simple, it is true, but we prefer to elicit practical answers from our readers.]

1.—GELATINE FOR PLASTER MOLDS.—What is the best way to make gelatin for plaster molds, for casting undercut plaster objects?—M. M. C.

2.—AMALGAM OF COPPER.—Can any of your numerous correspondents inform me the most expeditious method of forming a solid amalgam of copper?—T. C. T.

3.—STEAM HEATING PIPES.—I wish to know how best to connect the waste pipes, from the various rooms of a building heated by live steam, so as to run them all into one general waste or drip pipe, and yet prevent the steam, when only some of the rooms are heated, from rushing into the pipes not in use at the lower end. I have used, for this purpose, inverted check valves, with spiral springs around the stems to bear up the weight of the valves, placing one in a perpendicular portion of each drip pipe; but they sometimes stick fast in the seats, thus preventing the condensed water from escaping. What is needed is a contrivance which will allow the water to escape very readily, and yet prevent the steam from returning through it when the pipe is not in use.—R. T.

4.—INK STAINS ON LEATHER.—Can any of your correspondents tell me how to remove ink stains from the covers of law books without injuring the leather?—H. S.

5.—FIXING PENCIL MARKS ON LINEN.—Can you give me some simple recipe for rendering common lead pencil marks indelible on white linen goods?—P. A. B.

6.—DEXTRIN.—What is the formula for making dextrin, not the gummy substance that is used for envelopes, but the straw colored powder that the photographers use to put on their plates?—A. B.

7.—DYEING STRAW GOODS.—How can I color Leghorn straw a dark color?—A. B.

8.—GALVANIZING IRON WIRE.—Can some one tell me how to galvanize wrought iron wire?—L. W. C.

9.—CLEANING SHELLS.—I wish to clean some fresh water shells, that is, to take the outside and decayed part off, so that they will do for frame and other ornamental work. Will some of your readers tell me how?—L. W. C.

10.—SETTING BOILERS.—Can some of your numerous readers tell me how to set a boiler of the following dimensions, so as to give the best results from Iowa soft coal as fuel? Length of boiler, seven feet; diameter, twenty inches, with five four inch flues through the entire length. The stack is ten inches diameter and thirty-three feet high. Please give full particulars of size of furnace. In answer to A. H. G., G. A. T., on page 154, present volume, says: "I notice gas pipe used under the grate." Would an apparatus of this kind be suitable for my boiler? and if so, how far below the grates should the pipe be set?—J. W. H.

11.—ENAMELING IRON.—What is the process of enameling or glazing cast iron, such as is used in lining saucepans, so that heat or friction will not deface it?—E. P.

12.—ELECTRIC LIGHT.—Would any of your readers be kind enough to give directions by which one may construct an electric light?—W.

13.—CARBON BARS FOR BATTERIES.—Will some of your readers inform me how to make carbon bars or rods for batteries?—T. C. K.

14.—PITCH OF MOLDING MACHINE.—Will some of the readers of the SCIENTIFIC AMERICAN please tell me the most correct and easy way to get the right pitch of molding machine head, so that I can make the cutters to work the exact shape desired?—S. H.

15.—MICROSCOPE.—Will some of your readers give me instructions to build a microscope, and tell me what lenses to use?—E. T. N.

16.—REFINING GOLD.—I wish to know how to refine gold—a small quantity at a time—in the most expeditious and practical manner. Please give full details as to quantity of the articles used, and as to the time required, etc.—J. F.

17.—RECOVERING GOLD.—How can gold be recovered from a cyanide solution that has been made for electro gilding?—J. F.

18.—TEMPERING KNIFE.—How can I harden and temper a knife (twenty inches long and five inches wide), carpenter's chisels, and drawing knives, without their bending and warping?—I. A. C.

19.—BRAZING IRON.—How are iron cow bells brazed?—I. A. C.

20.—BENDING PIPE.—How can I bend a wrought iron pipe (say two inches diameter) without destroying its circular form?—I. A. C.

21.—RAT EXTERMINATOR.—Will some of your numerous correspondents tell me some means to expel rats from a building? Traps seem to be useless.—J. C. H.

22.—PURIFYING RUM.—How can rum or spirits distilled from molasses, be purified from the taste of the oil which gives them the flavor of rum?—A. L.

23.—INDELIBLE PRINTING INK.—Can any of the readers of the SCIENTIFIC AMERICAN tell me how to make printers' ink indelible?—W. E. C.

24.—PLASTER OF PARIS.—How can plaster of Paris be made harder and tougher when set, so as to lessen its liability to break when removing the mold from the object?—W. E. C.

25.—HARDENING STEEL PLATES.—I would like to know the quickest way to harden a large number of small plain steel plates; and also to draw the temper of them.—E. B. T.

26.—CARPETS.—Can any of your readers or any carpet manufacturers tell me what is the matter with my carpet? It is a new English tapestry, but the smell arising from it is horrible. The colors are blue green, brown, and red. Does the smell come from the dye? Will some one be kind enough to suggest a remedy?—B. K. S.

27.—COIL IN BOILER.—Will some one of your many readers inform me how I can put in a coil of pipe two inches in diameter, and keep it full of water? I had one in and had to take it out on account of leaking. The boiler is an upright one; the coil of pipe ran horizontally above the fire. I supplied the water in the boiler through the coil with hot water, and when it went in the boiler, the connection with coil and boiler was through an one inch pipe. As soon as I started fire, the heat would drive all the water out of the coil, and it would get red hot, and as soon as I had steam and ran the engine, and began to pump the water in the coil, it would leak sufficiently to put all the fire out. I used oakum and corn meal, and stopped the leaking; but as soon as I would stop pumping water, the pipe would get red hot, and there would not be a drop of water in the coil. One morning I watched when I fired up, and as soon as I had twenty pounds of steam, I heard steam blowing out of the coil. I looked, and in about half a minute, water came enough to put all the fire out and drain the boiler. There is but one connection from coil to boiler; the other is the supply.—M. S. M.

Declined.

Communications upon the following subjects have been received and examined by the Editor, but their publication is respectfully declined:

BOILER EXPLOSIONS.—G. H.—W. F. Q.
BURGLAR PROOF SAFES.—W. W.
LYNDE'S STEAM GOVERNOR.—J. B. B.
MECHANICAL MOVEMENT.—A. K. S.
MEN OF PROGRESS.—W. B. S.
PROPULSION OF CANAL BOATS.—H.
ANSWERS TO CORRESPONDENTS.—C. W. L.—M. H. B.—M. S. M.
QUERIES.—J. E. S.

APPLICATIONS FOR EXTENSION OF PATENTS.

BILLIARD TABLE CUSHION.—Hugh W. Collander, New York city, has petitioned for an extension of the above patent. Day of hearing, November 22, 1871.

BAGASSE FURNACE.—Charles N. Black, of New York city, administrator *de bonis non* of Moses Thompson, deceased, has petitioned for an extension of the above patent. Day of hearing, November 29, 1871.

MECHANICAL MOVEMENT FOR SEWING AND OTHER MACHINES.—James Hanley, New York city, has petitioned for an extension of the above patent. Day of hearing, November 29, 1871.

MODE OF LIGHTING GAS BY ELECTRICITY.—Samuel Gardiner, Jr., Washington, D. C., has petitioned for an extension of the above patent. Day of hearing, December 6, 1871.

SNOW PLOW.—Newcomb Demary, Jr., formerly of Warsaw, N. Y., has petitioned for an extension of the above patent. Day of hearing, November 29, 1871.

Value of Extended Patents.

Did patentees realize the fact that their inventions are likely to be more productive of profit during the seven years of extension than the first full term for which their patents were granted, we think more would avail themselves of the extension privilege. Patents granted prior to 1861 may be extended for seven years, for the benefit of the inventor, or of his heirs in case of the decease of the former, by due application to the Patent Office, ninety days before the termination of the patent. The extended time inures to the benefit of the inventor, the assignees under the first term having no rights under the extension, except by special agreement. The Government fee for an extension is $100, and it is necessary that good professional service be obtained to conduct the business before the Patent Office. Full information as to extensions may be had by addressing

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Practical Hints to Inventors.

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How Can I Obtain a Patent?

Is the closing inquiry in nearly every letter, describing some invention, which comes to this office. A *positive* answer can only be had by presenting a complete application for a patent to the Commissioner of Patents. An application consists of a Model, Drawings, Petition, Oath, and full Specification. Various official rules and formalties must also be observed. The efforts of the inventor to do all this business himself are generally without success. After great perplexity and delay, he is usually glad to seek the aid of persons experienced in patent business, and have all the work done over again. The best plan is to solicit proper advice at the beginning. If the parties consulted are honorable men, the inventor may safely confide his ideas to them: they will advise whether the improvement is probably patentable, and will give him all the directions needful to protect his rights.

How Can I Best Secure My Invention?

This is an inquiry which one inventor naturally asks another, who has had some experience in obtaining patents. His answer generally is as follows, and correct:

Construct a neat model, not over a foot in any dimension—smaller, if possible—and send by express, prepaid, addressed to MUNN & Co., 37 Park Row, New York, together with a description of its operation and merits. On receipt thereof, they will examine the invention carefully, and advise you as to its patentability, free of charge. Or, if you have not time, or the means at hand, to construct a model, make as good a pen and ink sketch of the improvement as possible, and send by mail. An answer as to the prospect of a patent will be received, usually, by return of mail. It is sometimes best to have a search made at the Patent Office; such a measure often saves the cost of an application for a patent.

Preliminary Examination.

In order to have such search, make out a written description of the invention, in your own words, and a pencil, or pen and ink, sketch. Send these, with the fee of $5, by mail, addressed to MUNN & Co., 37 Park Row, and in due time you will receive an acknowledgment thereof, followed by a written report in regard to the patentability of your improvement. This special search is made with great care, among the models and patents at Washington, to ascertain whether the improvement presented is patentable.

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To Make an Application for a Patent.

The applicant or a patent should furnish a model of his invention, if susceptible of one, although sometimes it may be dispensed with; or, if the invention be a chemical production, he must furnish samples of the ingredients of which his composition consists. These should be securely packed, the inventor's name marked on them, and sent by express, prepaid. Small models, from a distance, can often be sent cheaper by mail. The safest way to remit money is by a draft, or postal order, on New York, payable to the order of MUNN & Co. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents.

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OFFICE IN WASHINGTON—**Corner F and 7th streets,** opposite Patent Office.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

MACHINE FOR DOUBLE SEAMING TINWARE.—McDuff Cohen and Robert M. Edwards, Charleston, S. C.—This invention relates to a machine for putting double seams into circular tinware, by means of a horizontal disk, on which the article rests, and a vertical disk, between which and the horizontal disk, the article is pressed, and where it is guided by an adjustable wheel separate from either of said disks, of which latter the vertical one has two parallel circumferential grooves, one beginning, and the other completing the double seam.

BOILER FIRE EXTINGUISHER.—Thomas R. Sinclaire, New York city.—This invention relates to a means for enabling a boiler to put out its own fires when steam is raised in it to a point beyond the permitted limit, by means of a system of pipes connecting the boiler and furnace, and provided with a safety water valve which, when the pressure is sufficient to raise its weight, rises, thus allowing water to be forced from the boiler to the furnace.

BLACKING BOX.—Edward M. Gates, Watertown, N. Y.—This invention consists of a blacking box and handle made from a single piece of wood, and provided with a swinging lid. It forms a neat and tidy holder for the blacking, and can be handled when using the blacking without liability of soiling the fingers.

AGITATOR FOR WASHING MACHINE.—Van Vanderburgh, of Bacon Hill, assignor to Horatio Graves, of Warsaw, N. Y.—This is a new rotary agitator for washing machines and wash boilers, to be used for disturbing the suds and causing them to properly strike the articles to be cleaned. The invention consists chiefly in providing the rotary agitator with an upwardly projecting flange or rim and open loops, which produce currents in the water.

REEL FOR HARVESTER.—D. Chaplin Nutting and Joseph D. Allen, of Bowling Green, Ky.—This is an improvement in the mode of adjusting (raising and lowering) the reels of reapers; and consists in the use of a rack and pinion operating on an arc of a circle concentric with the driving pulley of the reel. By simply turning a crank the hight of the reel can be varied as may be desired. By means of the circular rack the tension of the belt which impels the reel remains the same when the reel is moved up or down. The advantages of this arrangement will be readily understood by all who are acquainted with reaping machines.

CARRIAGE WASHING MACHINE.—Oliver P. Weston, of Shattuckville, Mass.—This apparatus for washing carriages consists in a combination of a pair of washing boxes and a lifting jack adapted for running the carriage into the boxes, the covers being withdrawn, and letting the wheels down into the water in the boxes, but supporting them above the bottom to allow them to be turned freely on the axles for washing, by which the water applied for washing them and the body of the carriage will be received as it falls into the boxes to be used as long as required. A great economy of water and labor is effected by this device, and doubtless the heavy water rates now exacted from livery stables in cities would be reduced by its general adoption.

HANDLE FOR CARRIAGE DOOR.—Edward Wells, of New Haven, Conn.—The object of this invention is to prevent the inner handle of a carriage door from being an obstruction to ladies' dresses, etc., and at the same time to furnish a powerful lever for opening the lock. The invention consists in concealing the crank of the handle between the body and inner lining of the door, and in providing a curved slot in said lining through which the crank pin or knob of the handle projects, so that, in fact, but a portion of said knob will project from the inner face of the door. The inconvenience of the long projecting handle is thus overcome, and still greater power available, as a longer crank proper may be used concealed than when in sight. This is an useful improvement, and one susceptible of beauty of design as well as utility. It is worthy the attention of manufacturers and dealers in such articles.

COTTON PRESS.—John Schley, of Savannah, Ga.—This improvement in cotton presses consists in one or more gangs, comprising two presses, with vertical followers working horizontally toward and from an operating shaft on opposite sides of it, with vertical press boards, the said followers being operated by right and left threaded nuts on the said operating shaft, which is correspondingly threaded, to which nuts they are connected by knuckle jointed arms in a manner to provide a cheaply constructed apparatus, which being worked by power, and when two gangs are used, being so arranged that the presses of one gang open while the others close, is calculated to turn off the work very rapidly, affording continuous employment for the attendants in attending to one gang while the other is in the condition not to require attendance. The shaft is to be operated by any competent power being turned in one direction for retracting the followers and the other way for pressings.

MECHANICAL MOVEMENT.—Charles W. Hurd, of Comstock's Landing, N. Y.—A horizontal lever is pivoted in the center. From the lever, each side of and at a suitable distance from the central pivot, extend two connecting rods. One of each pair of connecting rods or links is connected with one of a pair of vertical pivoted levers, above its center of motion, and the second rod of each pair is connected with the second of each pair of vertical pivoted levers, below its center of motion, by which means, when motion is imparted to the connecting rods by oscillating the horizontal pivoted lever, the four vertical levers are moved in opposite directions. The movement is designed for washing machines, churns, etc., for which it seems well adapted.

MARTIN'S ELECTRO-MAGNETIC FIRE ALARM TELEGRAPH.—This invention relates to a new electric fire alarm which is liberated by the motion of the armature, so that whenever the circuit is closed the alarm will be sounded. The invention consists in the combination with a detaining armature of a drop lever which liberates the alarm, said lever containing a card or plate marked to show the number of the fire district whence the alarm emanates. The alarm box is screwed to a wall or other suitable support, the lower or automatic box being secured far enough below it so that the bar or drop lever will work properly, and the alarm is then wound up. A wire runs from the magnets to a battery located at a suitable point, and another wire runs thence to one of the alarm boxes, such as are commonly attached to posts or walls of buildings in cities, and made convenient of access for watchmen, policemen, etc. The lever placed in such box is also connected with a circuit wire which communicates with the battery. By pressing down the lever, the electric current is sent through the wires that run to the magnets, and which are thus caused to attract the armature and sound the alarm. John W. Martin, of St. Joseph, Mo., is the inventor of this instrument.

LOCK FOR ALARM TILLS.—William H. Tucker, Indianapolis, Ind.—This invention relates to locks, for that class of tills for holding money or valuables, that are provided with alarms which sound, when the till is attempted to be opened burglariously, and thus attract the attention of those within hearing; said invention appertaining to the species of lock termed "combination," and consisting in an improved apparatus for operating the catches that secure the till, when locked, and in an improved apparatus for operating a second alarm that is connected with this lock, in addition to the ordinary alarm, for the purpose of preventing persons from trying to discover the combination.

METAL CARPET BINDING.—Reuel P. Johnston, of Steubenville, Ohio.—This invention relates to a new and useful improvement in binding carpets, whereby strength and durability in the binding are secured, and much time and trouble saved in putting down carpets; and it consists in forming teeth or books upon the opposite edges or strips of any suitable kind of sheet metal, and bending them over so that they are nearly parallel with the side of the plate or strip of metal, and then curving or bending the metallic strips so that the teeth upon each edge will engage with the edge of the carpet and securely attach the curved strip thereto, as hereinafter more fully described. It also consists in the device for fastening the metallic binding to the floor or base board of the room, which is done by hooks passing through slot holes in the binding, and which are screwed or nailed, or otherwise fastened to the floor, or to the base board of the room, as may be found most convenient. These hooks are fastened down first, and then the carpet is attached thereto with very little trouble.

PAPER WRAPPER FOR NEEDLES.—Mary Emma Baylis, of Redditch, England, assignor to Henry Baylis, of New York city.—In her specification the inventor says: In making a needle case or wrapper according to my invention, I take a blank piece of paper, or other flexible material, and fold it and paste its overlapping edges so as to make it into a flat tube, the said tube having the width of the case or wrapper to be made, and being somewhat longer than twice the length of the said case. From one side of the said flat tube, portions are cut away at its middle and at its ends. When the said tube is folded at its middle (the cut away side being inward), and the ends are turned down, it constitutes a double wrapper, in each of the flaps or sides of which twenty-five or other number of needles, stuck on fabric in the ordinary way, may be introduced. The cut away parts of the case or wrapper exhibit both the heads and points of the needles. Before closing the two sides or flaps of the case or wrapper, the ends are turned down so as to cover the tops of the needles. The case or wrapper may be inserted in a sheath of the ordinary kind. For convenience in removing the case or wrapper from the sheath, the top of the case or wrapper is provided with a tab, by griping which between the finger and thumb the case may be readily withdrawn from the sheath.

HAME TUG FOR HARNESS.—Paul R. Dawson, of Brenham, Texas.—This invention has its object to furnish an improved iron hame tug which shall be strong, durable, simple in construction, easily applied, and effective in operation. It consists in the construction and combination of a body, a detachable jointed eye, and lock plate, said parts being constructed and operating as specified. Also a pivoted guard, rod, and lugs, applied to the rear end of the tug.

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119,003.—WATER METER.—H.M.Bartlett, South Dedham, Mass.
119,004.—WATER METER.—H.M.Bartlett, South Dedham, Mass.
119,005.—BONE BLACK.—C. Y. Beach, Brooklyn, N. Y.
119,006.—TOY.—E. Beggs, Paterson, N. J.
119,007.—MORTISE MACHINE.—H. Bickford, Cincinnati, O.
119,008.—FIRE ESCAPE.—G. W. Bishop, H. H. Smith, Baltimore, Md.
119,009.—BALING PRESS.—G. Brodie, Plum Bayou, Ark.
119,010.—WOOD PAVEMENT.—C. P. Burgess, Rochester, N. Y.
119,011.—ROTARY PUMP.—L. Chapman, Collinsville, Conn.
119,012.—LATHE.—H. Chavons, Union City, Ind.
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119,020.—GUN LOCK.—W. R. Evans, Thomaston, Me.
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119,022.—GRAIN DRILL.—J. P. Floom, Canton, Ohio.
119,023.—GRAIN DRILL.—J. P. Floom, Canton, Ohio.
119,024.—SAP BUCKET.—A. Franklin, Galena, Ohio.
119,025.—PIANO TRUCK.—C. A. French, Davenport, Iowa.
119,026.—WATER WHEEL.—J. G. Garretson, West Liberty, O
119,027.—PACKING.—W. W. Girdwood, Bromley, Eng.
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119,029.—HARVESTER.—M. Harrison, Laclede, Mo.
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119,053.—MEDICAL COMPOUND.—O. Scidmore, Albany, N. Y
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119,062.—ROLLING PIN.—W. Thomas, Hingham, Mass.
119,063.—WASH BOILER.—J. C. Tilton, Pittsburgh, Pa.
119,064.—GRADING MACHINE.—G. Trump, Second Fork, Pa
119,065.—JOURNAL, ETC.—S. Ustick, Philadelphia, Pa.
119,066.—RANGE.—J. Van, Cincinnati, Ohio.

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119,069.—WASHING MACHINE.—P. Young, N. Doll, Robertsville, Ohio
119,070.—WASHING MACHINE.—P. Young, N. Doll, Robertsville, Ohio.
119,071.—CHAIR, ETC.—A. Abrahams, Syracuse, N. Y.
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119,149.—CLEANING COFFEE.—G.W. Hungerford, Chicago, Ill.
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119,159.—WINDMILL.—I. Lehmer, Lima, Ind.
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119,161.—FIRE ESCAPE.—H. and G. Luckenbach, Phila., Pa.
119,162.—CHILD'S CARRIAGE.—H. Lutz, New York city.
119,163.—PLANING MACHINE.—G. H. Mansfield, Concord, N.H.
119,164.—TRANSMITTING POWER.—O. Marland, Boston, Mass.
119,165.—SAFE.—B. H. Martin, Ann Arbor, Mich.
119,166.—CARRIAGE TOP.—A. McKenzie, Westminster, Eng.
119,167.—COMPOSITION.—J. Muller, Newark, N. J.
119,168.—FUR BOX.—S. C. Nichols, Buffalo, N. Y.
119,169.—CULINARY STEAMER.—J. S. Ogden, Johnstown, Pa.
119,170.—HARVESTER.—W. J. Oxer, Williamsport, Ind.
119,171.—LUBRICATOR.—T. Parker, Shelby, N. C.
119,172.—HARVESTER.—C. J. C. Petersen, Port Chester, N. Y.
119,173.—DRILL CHUCK.—P. Philippi, Beardstown, Ill.
119,174.—FAN MILL.—A. Plymate, Garden City, Minn.
119,175.—GALVANIC BATTERY.—E. Prevost, New York city.
119,176.—ELECTRO MAGNET.—E. Prevost, New York city.
119,177.—SCISSORS.—E. Prevost, A. Rablat, New York city.
119,178.—GATE.—W. A. Pugh, J. F. Bigger, Rushville, Ind.
119,179.—MEDICAL COMPOUND.—T.B. Randell, New York city.
119,180.—FASTENER.—E. F. Reed, J. C. Grundy, Chelsea, Mass.
119,181.—HARVESTER.—A. F. Roberts, Lexington, Ky.
119,182.—FURNACE.—A. Pollok, Washington, D. C.
119,183.—COUPLING.—T. H. Ryder, Mentor, Ohio.
119,184.—PIANO PEDAL.—S. Schoenbrun, New York city.
119,185.—STEAM BOILER.—W. C. Selden, Brooklyn, N. Y.
119,186.—PAPER STOCK, ETC.—C. F. A. Simonin, Phila., Pa.
119,187.—FABRIC.—C. F. A. Simonin, Philadelphia, Pa.
119,188.—EXTRACTING FAT.—C.F.A. Simonin, Philadelphia, Pa.
118,189.—CISTERN.—J. Q. Simonson, Graniteville, N. Y.
119,190.—FIRE EXTINGUISHER.—T.R. Sinclaire, New York city.
119,191.—DRYER.—C.F. Smith, Aurora, A. Haerther, Chicago, Ill.
119,192.—GANG PLOW.—H. B. Smith, Tremont, Ill.
119,193.—CHURN.—T. C. Smith, N. L. Francis, Oquawka, Ill.
119,194.—WATER WHEEL.—W. H. Snyder, Phelps, N. Y.
119,195.—PRESS.—T. Stibbs, Wooster, Ohio.
119,196.—COUPLING.—J. Temple, Bellefonte, Pa.
119,197.—NECKTIE HOLDER.—H. H. Thayer, Philadelphia, Pa.
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119,199.—WINDOW PULLEY.—N. Thompson, Brooklyn, N. Y.
119,200.—GAGE.—G. W. Tinsley, Blakesburg, Iowa.
119,201.—LOOM SHUTTLE.—F. O. Tucker, Stonington, Conn.
119,202.—LOCK.—W. H. Tucker, Indianapolis, Ind.
119,203.—FLOOR CLAMP.—T. S. Urie, Hubbardston, Mich.
119,204.—WIRE BAIL.—J. P. Van Bramer, Galesburg, Ill.
119,205.—CULTIVATOR.—J. A. Viars, Sherman, Texas.
119,206.—CULTIVATOR.—J. Waddell, Liberty, Ind.
119,207.—SHOE.—E. Walcott, Natick, Mass.
119,208.—KITCHEN TABLE.—B. Welteck, New York city.
119,209.—DITCHING MACHINE.—D. Whitesell, Mattoon, Ill.
119,210.—DIVING APPARATUS.—C. Wilson, Bridgeport, Conn.
119,211.—FLOOD FENCE.—J. L. Wines, Hebardsville, Ohio.
119,212.—LETTER BOX.—S. N. Brooks, Shelburne Falls, Mass.
119,213.—BALE HOOK.—R. T. Yardley, Baltimore, Md.
119,214.—COMPOUND.—D. C. Yates, Big Lick, Va.

REISSUES.

4,556.—SEWING MACHINE.—J. S. Alter, Leavenworth, Kan.—Patent 102,479, dated May 3, 1870.
4,557.—TREATING OIL.—D. E. Breinig, New York city.—Patent No. 61,653, dated January 29, 1867.
4,558.—COLORING MATTER.—J. Brönner, H. Gutzkow, Frankfort-on-the-Main, Prussia.—Patent No. 97,597, dated December 7, 1869.
4,559.—CORN PLANTER.—W. Morrison, Carlisle, Pa.—Patent No. 25,435, dated September 13, 1859.
4,562.—ROLLING LEATHER.—J. Whitney, Winchester, Mass. Patent No 37,991, dated March 24, 1863; reissue No. 4,122, dated September 13, 1870.
4,563.—CEMENT PIPE.—E. L. Baker, Boston, Mass., H. Knight, Brooklyn, N. Y., E. Dayton, Meriden, Conn.—Patent No. 49,828, dated September 5, 1865; antedated August 28, 1865.
4,564.—BED BOTTOM.—H. E. Bissel, Hartford, Conn.—Patent No. 94,701, dated September 14, 1869.
4,565.—FURNACE.—L. Cutting, San Francisco, Cal.—Patent No. 71,141, dated November 19, 1867.
4,566.—THRASHING SEED, ETC.—M. H. Mansfield, Ashland, Ohio.—Patent No. 56,583, dated July 24, 1866.

DESIGNS.

5,267.—SPOON HANDLE.—B. D. Beiderhase, New York city.
5,268.—SAW FRAME.—W. H. Doane, Cincinnati, Ohio.
5,269.—GLASSWARE.—J. Oesterling, Wheeling, W. Va.
5,270.—NET FABRIC.—J. Slack, Brooklyn, N. Y.
5,271.—OIL CABINET.—M. H. Wiley, Boston, Mass.
5,272.—CARPET PATTERN.—J.M. Christie, Kidderminster, Eng.
5,273.—PICKLE JAR OR CASTER.—J. Hill, West Meriden, Conn.
5,274.—SHUTTLE, ETC.—E. J. Steele, Wolcottville, Conn.
5,275.—CASTER RING.—E. J. Steele, Wolcottville, Conn.

TRADE MARKS.

442.—SEEDS.—Briggs & Bro., Rochester, N. Y.
443.—SEEDS.—Briggs & Bro., Rochester, N. Y.
444.—GIN.—J. Forster, New Orleans, La.
445.—HAIR RESTORER.—E. A. Warren, Worcester, Mass.

NEW BOOKS AND PUBLICATIONS.

SCHOOL HOUSES. By James Johonnot. Architectural Designs by S. E. Hewes. New York: J. W. Schermerhorn & Co.

This work opens with a general essay upon the requisites of schoo houses, including the important subjects of heating and ventilation, and then gives a large number of graceful and convenient designs for school houses of various kinds, together with dissertations upon the ornamentation of school grounds, and other cognate matters of interest to educators. The work is printed, in beautiful style, on tinted paper, and handsomely bound in cloth.

QUESTIONS OF THE DAY; ECONOMIC AND SOCIAL. By Dr. William Elder. Philadelphia: Henry Carey Baird, 406 Walnut Street.

We wish our limits of space, and the time necessary to the performance of our other editorial labors, would admit of a thorough review of this book. The questions it discusses are those upon which much diversity of opinion prevails, and it is only by their agitation and discussion that real solid conclusions will ever be reached. The condition of women, so far as their relations to society as workers are concerned, is grappled with by the author, but the question of greater freedom in the matrimonial relation is not, so far as we can see, alluded to. This question is one that must be dealt with, and we had hoped that those who essay to teach the world sociology would not henceforth evade it. There is little doubt that proper discussion on this point would lead to greater freedom in contracting, and stipulating the terms of contract, than at present, while it would make the contract itself even more binding than at present. The book deals largely with the subject of Wealth, and its distribution—of Wages, and the laws which govern them—of Co-operation, Protection, and kindred topics, and is one which no intelligent man can read without profit.

THE INDUSTRIAL PROGRESS OF NEW SOUTH WALES. Being a Report of the Intercolonial Exhibition of 1870, at Sydney; together with a variety of Papers illustrative of the Industrial Resources of the Colony. By Authority. Sydney: Thomas Richards, Government Printer.

This is, perhaps, the most complete exhibit of the resources, agricultural and mineral, of the colony of New South Wales, ever published. Those who wish to learn more of this rapidly developing country, would do well to possess themselves of the book.

A TREATISE ON THE MANUFACTURE AND DISTILLATION OF ALCOHOLIC LIQUORS. Comprising Accurate and Complete Details in Regard to Alcohol from Wine, Molasses, Beets, Grain, Rice, Potatoes, Sorghum, Asphodel, Fruits, etc. With the Distillation and Rectification of Brandy, Whiskey, Rum, Gin, Swiss Absinthe, etc.; the Preparation of Aromatic Waters, Volatile Oils or Essences, Sugars, Aromatic Tinctures, Liqueurs, Cordial Wines, Effervescing Wines, etc.; the Aging of Brandy and Improvement of Spirits: with Copious Directions and Tables for Testing and Reducing Spirituous Liquors, etc., etc. Translated from the French of MM. Duplais, Ainé et Jeune. By M. McKennie, M.D. To which are added the United States Internal Revenue Regulations for the Assessment and Collection of Taxes on Distilled Spirits. Illustrated by fourteen Folding Plates and several Wood Engravings. Philadelphia: Henry Carey Baird, Industrial Publisher, 406 Walnut Street. London: Sampson Low, Son, & Marston, Crown Buildings, 188 Fleet Street.

This is a large octavo of 743 pages. The title sufficiently sets forth the matter, and the manner of treatment is sufficiently guaranteed by the names of the distinguished French authors of whose works the present is a translation. The translator has done his work very creditably, and the publisher has increased the obligations the American public owe to him by this fine addition to the already long list of his industrial publications. No distiller can afford to be without this work. It will be sent, post-paid, upon receipt of price—$10.00.

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Mr. Leeds is one of the few writers upon the subject of ventilation who treats it with sufficient regard to its practical details. His style of writing, though it shows no effort at display of learning or profundity, is of that kind which appeals to the common sense, and has just that spice of humor in it that keeps the interest and sympathy of the reader. The illustrations are capital aids to the clear exposition of the subject, and the work is every way worthy of the widest circulation.

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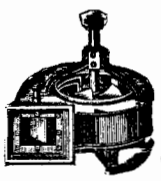

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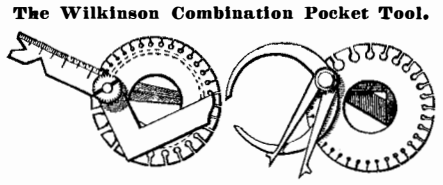

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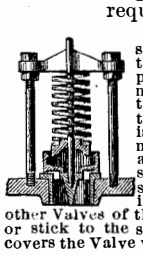

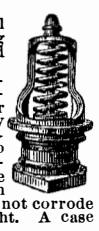

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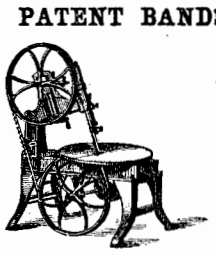

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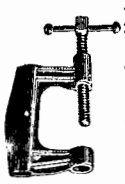

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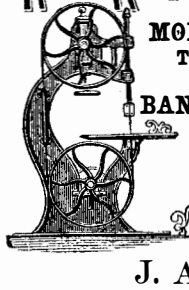

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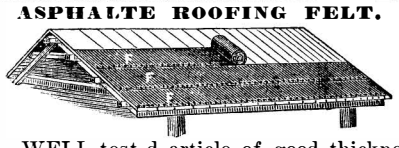

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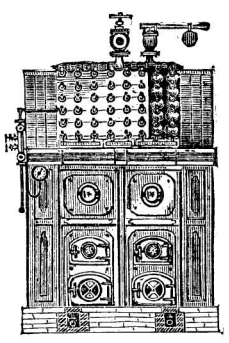

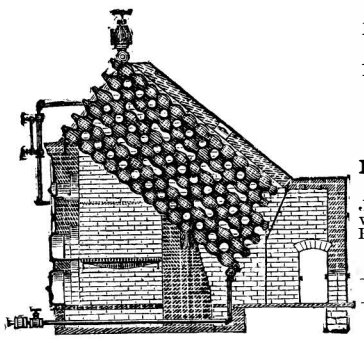

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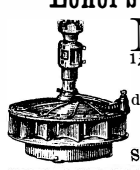

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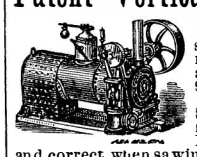

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